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(6) A COMPARATIVE STATISTICAL ANALYSIS
OF SELECTED OUTPATIENT CLINICS
AT USAF HOSPITAL SCOTT, (7)-(9) NA

(10) BY
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ABSTRACT

THIS STUDY WAS CONDUCTED IN A 300 BED AIR FORCE MEDICAL FACILITY LOCATED IN SOUTHERN ILLINOIS. THE STUDY CONCERNED ITSELF WITH FINDING OUT HOW LONG PATIENTS WAITED TO SEE PHYSICIANS IN A GROUP PRACTICE TYPE CLINIC; HOW MUCH TIME WAS SPENT WITH THE PHYSICIAN; AND HOW MUCH TIME WAS SPENT AT THE VARIOUS ANCILLARY SERVICES PATIENTS WERE SENT TO FOR SERVICE. THE DATA WAS COLLECTED AND THE INFORMATION WAS PUNCHED INTO IBM CARDS. THE DATA REVEALED THAT WAITING TIMES WERE REASONABLE GENERALLY BUT THAT PATIENTS DID EXPERIENCE LONG WAITS IN INDIVIDUAL CLINICS. PATIENTS VISITING ANCILLARY SERVICES EXPERIENCED SHORT WAITING AND SERVICE TIMES.

PATIENTS ARRIVING EARLY AND PATIENTS ARRIVING LATE AT THE CLINICS TEND TO PRODUCE A RANDOM ARRIVAL PATTERN, MAKING IT DIFFICULT TO OPERATE THE APPOINTMENT SYSTEM WITHOUT SOME CONTROLS ON THE PATIENTS' ADMISSION TO THE PHYSICIAN'S OFFICE. THE NUMBER OF WALK-IN PATIENTS HAS A SERIOUS EFFECT ON THE APPOINTMENT SYSTEM AND PROVISIONS FOR THESE PATIENTS SHOULD BE BUILT INTO THE APPOINTMENT SYSTEM.

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CHAPTER I. INTRODUCTION

A. Nature of the Problem.

The outpatient clinic in a military hospital is the focal point for all ambulatory care and it is this service that receives a critical evaluation by all military members and their families upon their first visit to the medical facility. The amount of time spent in waiting by ambulatory patients in the outpatient clinic is the most prominent and most understandable complaint against the hospital service. Now matter how well a patient may be cared for both medically and administratively as an inpatient, if he or a member of his family has to wait for an appointment at one of the clinics, the good image of the hospital is destroyed. Inpatience is a common fault among all people, and particularly among the sick or wounded.

Appointment systems have been the practice in Air Force hospitals for many years, but not until recent years has additional emphasis been placed on the use of appointment systems that will decrease waiting time and provide more efficient handling of the individual patient. Originally, observations of individual clinics at the USAF Hospital Scott led us to believe that, in some of the specialty clinics, the appointment system seemed to be operating effectively; there were few patients in the waiting rooms and a short waiting period was experienced by

most patients. In other clinics, such as the Pediatric and Adult Clinics (a general practice clinic for adults), the waiting rooms seemed to be filled continually, waiting times were longer than in the other clinics, people's expressions showed anger and impatience and a generally sullen air prevailed in the waiting rooms. Physicians in all the clinics were kept busy throughout the hours the clinic was in operation, and nurses and medical technicians were actively engaged in escorting and attending patients.

It seemed that patients in the more general type of clinics, the Pediatric and Adult Clinics, were experiencing a much longer waiting time than those in the more specialized clinics such as the General Surgery Clinic and the Medical Specialty Clinic. It also seemed evident that there were considerably more walk-in patients in the two former clinics than in the latter ones. The nature of the problem was to determine statistically if this were true and if so to determine why.

B. Objectives.

The objectives of this study are contained in the following hypotheses:

Hypothesis I. There is no difference in the average waiting times experienced by patients in the Surgical and Medical Specialty Clinics as compared to the Pediatric and Adult Clinics.

Hypothesis 2. Patients did not, on the average, wait to see a physician longer than fifteen minutes after their appointment time in each clinic.

Hypothesis 3. There is no difference in the number of walk-in patients relative to the appointment patients in the Pediatric and Adult Clinics as compared to the Surgical and Medical Specialty Clinics.

C. Relationship of the Problem to Public Health.

Outpatient departments have become affiliated with hospitals in our civilian communities as a result of the public's need for economical and efficient service. Although military outpatient services have been provided for military members in the form of dispensaries since the advent of the Armed Forces, only in recent years have extensive diagnostic, supportive and preventive services been made available to all of the military community, including the family of military members.

Comprehensive medical care is now provided for military members and their families, and the initial contact for medical care usually begins in the Air Force Clinic, which is the term used to describe the complete outpatient service of an Air Force hospital. Our military hospitals of today represent comprehensive diagnostic, preventive and treatment centers serving a controlled group of military members and their families with the latest in medical equipment and know-how. They have specialists in all fields and an opportunity to instruct the ambulatory as well as the bed patient in good health practices.

THE NUMBER OF AIR FORCE DEPENDENTS HAS GROWN FROM 470,000 IN 1955 TO 796,300 IN 1960. THIS GROWTH HAS DEMONSTRATED ITSELF IN THE INCREASED NUMBER OF CHILDHOOD DISEASES TREATED.[1] STATISTICS SHOW THAT IN AIR FORCE FACILITIES THERE WERE 400,000 INPATIENT ADMISSIONS AND 12,000,000 OUTPATIENT VISITS PER YEAR IN 1960.[2] THE FIGURES INDICATE THE INCREASE IN OUTPATIENT CARE REQUIRED TO SUPPORT MILITARY FAMILIES LIVING AT OR NEAR AIR FORCE BASES DISPERSED THROUGHOUT THE WORLD.

IT HAS BEEN SIAD THAT THE EXTENT OF HOSPITAL SERVICE IS TO BE MEASURED BY BED CAPACITY. THIS IS NOT WHOLLY TRUE; WHERE ONCE THE HOSPITAL PROVIDED FOR BED CARE EXCLUSIVELY, TODAY IT SERVES MILLIONS WHO APPLY FOR TREATMENT IN OUTPATIENT DEPARTMENTS OR CLINICS. PROPER DIAGNOSIS, TREATMENT AND FOLLOW-UP IN THE CLINIC MAY ELIMINATE THE NEED FOR HOSPITALIZATION ALTOGETHER, OR THE WORK-UP DONE PRIOR TO ADMISSION MAY DECREASE THE LENGTH OF HOSPITAL STAY.[3]

ALTOGETHER IT MUST BE CLEARLY UNDERSTOOD THAT ESTABLISHING A CLINIC OR HAVING AN OUTPATIENT SERVICE AVAILABLE FOR INDIGENT AND/OR NON-INDIGENT PATIENTS DOES NOT IN ITSELF PROVIDE GOOD MEDICAL CARE, IT DOES PROVIDE THE ADMINISTRATIVE AND ORGANIZATIONAL STRUCTURE FOR MANY PATIENTS TO BE SEEN BY PHYSICIANS WHO OTHERWISE

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[1] MAJOR GENERAL OLIVER K. NIESS, SURGEON GENERAL, UNITED STATES AIR FORCE, "MEDICINE IN THE AEROSPACE AGE," UNITED STATES ARMED FORCES MEDICAL JOURNAL, VOLUME 11, NUMBER 1 (JANUARY 1960) PP 34-35.

[2] IBID.

[3] RAYMOND P. SLOAN, THIS HOSPITAL BUSINESS OF OURS, PP 200-201.

MIGHT GO UNATTENDED AND EVENTUALLY BE HOSPITALIZED. THE PREVENTION OF DISEASE BY EARLY DIAGNOSIS AND TREATMENT HAS DONE MUCH TO DECREASE THE NUMBER OF HOSPITALIZED PATIENTS. GINZBERG[4] HAS CALLED ATTENTION TO THE ECONOMIC AND MEDICAL ADVANTAGES OF OUTPATIENT CARE.[5]

REPORTING ON THE FIRST NINE MONTHS IN OPERATION OF THE NATIONAL HEALTH SERVICE, THE CHIEF MEDICAL OFFICER OF THE MINISTRY OF HEALTH SAID:

> OUTPATIENT ATTENDANCES BEGAN IMMEDIATELY TO RISE. THIS WAS A REAL INCREASE IN THE NUMBER OF PATIENTS, FOR THE NUMBER OF ATTENDANCES PER PATIENT DID NOT RISE. THE INCREASE HAS BEEN PARTICULARLY NOTICEABLE IN GYNECOLOGY, RADIOLOGY, PATHOLOGY AND OPHTHALMOLOGY, BUT IT HAS AFFECTED OTHER SPECIALTIES AS WELL. IT WAS NOT UNEXPECTED AND INDEED MARKED ONLY AN ACCENTUATION OF CHANGE ALREADY APPARENT BEFORE THE APPOINTED DAY--A CHANGE WHICH IS STEADILY INCREASING THE EMPHASIS ON HOSPITALS AS CENTERS FOR DIAGNOSIS RATHER THAN MAINLY INSTITUTIONS PROVIDING BEDS FOR THE TREATMENT OF THE SICK.[6]

THE NATIONAL HEALTH SERVICE OF ENGLAND HAS CONTINUED THE USE OF OUTPATIENT DEPARTMENTS SINCE ITS INCEPTION, RECOGNIZING THEM AS A MEANS TO PROVIDE SERVICE MORE EFFICIENTLY TO LARGE NUMBERS OF

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[4]GINZBERG, E., A PATTERN FOR HOSPITAL CARE: FINAL REPORT OF THE NEW YORK STATE HOSPITAL STUDY. COLUMBIA UNIVERSITY PRESS, NEW YORK, N. Y., 1949, P 19.

[5]GLENN J. COLLINS, "HOSPITAL OUTPATIENT SERVICE AND SOUND PLANNING," UNITED STATES ARMED FORCES MEDICAL JOURNAL, VOL 11, NO 5 (MAY 1960) P 516.

[6]MINISTRY OF HEALTH (1958), REPORT OF THE YEAR ENDED 31 MARCH 1949. LONDON 119, PP 31-54.

OUTPATIENTS. THE UNITED STATES ARMED FORCES HAS FACED AND STILL FACES THE PROBLEM OF PROVIDING GOOD MEDICAL CARE TO ITS INCREASING NUMBER OF SERVICEMEN AND THEIR FAMILIES IN THE AIR FORCE CLINIC. THE INCREASED WORKLOAD GENERATED BY THIS INCREASE IN PATIENTS PLACES A BURDEN UPON THE MEDICAL STAFF AND THE FACILITIES THEMSELVES, UNLESS STEPS ARE TAKEN TO INCREASE THE EFFICIENCY OF PEOPLE AS WELL AS PROCEDURES. THE APPOINTMENT SYSTEM, ALTHOUGH NOT A PANACEA FOR ALL OF THE PROBLEMS PRESENT IN THE ADMINISTRATION OF OUTPATIENT DEPARTMENTS, CAN BE A VALUABLE AID IN INCREASING THE EFFICIENCY OF THIS DEPARTMENT.

THE APPOINTMENT SYSTEM MAY BE OF THE BLOCK TYPE WHERE SEVERAL PATIENTS ARE GIVEN APPOINTMENTS FOR THE SAME TIME AND ALL ARE EXPECTED TO BE SEEN DURING A SET INTERVAL, OR THE INDIVIDUAL APPOINTMENT SYSTEM WHERE THE PATIENT IS GIVEN A DEFINITE TIME FOR HIS APPOINTMENT. IN EITHER CASE THE WAITING TIME BY THE PATIENT AFTER HIS ARRIVAL IS THE CRITERION THAT THE PATIENT USES TO EVALUATE THE APPOINTMENT SYSTEM. THE LESS WAITING TIME THE PATIENT EXPERIENCES, THE HIGHER HIS PRAISE OF THAT PARTICULAR CLINIC; THE LONGER THE WAITING PERIOD, THE LOUDER HIS CRITICISM.

A REVIEW OF THE LITERATURE ON THE APPOINTMENT SYSTEM REVEALS THAT FEW STUDIES OF THIS NATURE HAVE BEEN CONDUCTED IN THE UNITED STATES. THE NATIONAL HEALTH SERVICE HAS DEVOTED CONSIDERABLE TIME TO INVESTIGATIONS WHICH REVEAL THAT A WAITING TIME OF FROM FIFTEEN TO THIRTY MINUTES AFTER APPOINTMENT IS CONSIDERED REASONABLE.

THE AUTHOR, FROM HIS OWN PERSONAL EXPERIENCE AS A PATIENT, AND AS A FATHER WAITING WITH HIS CHILDREN TO SEE A PHYSICIAN, AND FROM HAVING OBSERVED PATIENTS IN CLINICS, IS OF THE OPINION THAT A FIFTEEN MINUTE WAIT IS REASONABLE AND SHOULD BE A REASONABLE GOAL FOR WHICH THE CLINICS SHOULD STRIVE. HYPOTHESIS 2 OF THIS STUDY ATTEMPTS TO PROVE OR DISPROVE THAT THE AVERAGE WAITING TIME FOR EACH CLINIC IS LESS THAN FIFTEEN MINUTES. THIS FIGURE, TAKEN AS AN AVERAGE, GIVES A DEGREE OF LATITUDE TO WAITING TIMES, FOR SOME PATIENTS MAY HAVE TO WAIT CONSIDERABLY LONGER THAN FIFTEEN MINUTES WHEREAS OTHERS WILL WAIT LESS.

IN THE AUTHOR'S OPINION THE ULTIMATE GOAL WOULD BE TO DEVISE A SYSTEM WHEREBY, IN ACTUAL OPERATION, EACH PATIENT WITH AN APPOINTMENT WOULD WAIT LESS THAN FIFTEEN MINUTES AFTER HIS APPOINTED TIME. TO ATTAIN AND MAINTAIN THIS GOAL WOULD REQUIRE MUCH INTEREST AND PARTICIPATION ON THE PART OF ALL CLINIC PERSONNEL, PARTICULARLY THE PHYSICIAN, AND ADMINISTRATIVE RECOGNITION OF ITS DESIRABILITY FOR BOTH PATIENTS AND MEDICAL PERSONNEL.

D. <u>THE STUDY AND ITS SETTING</u>.

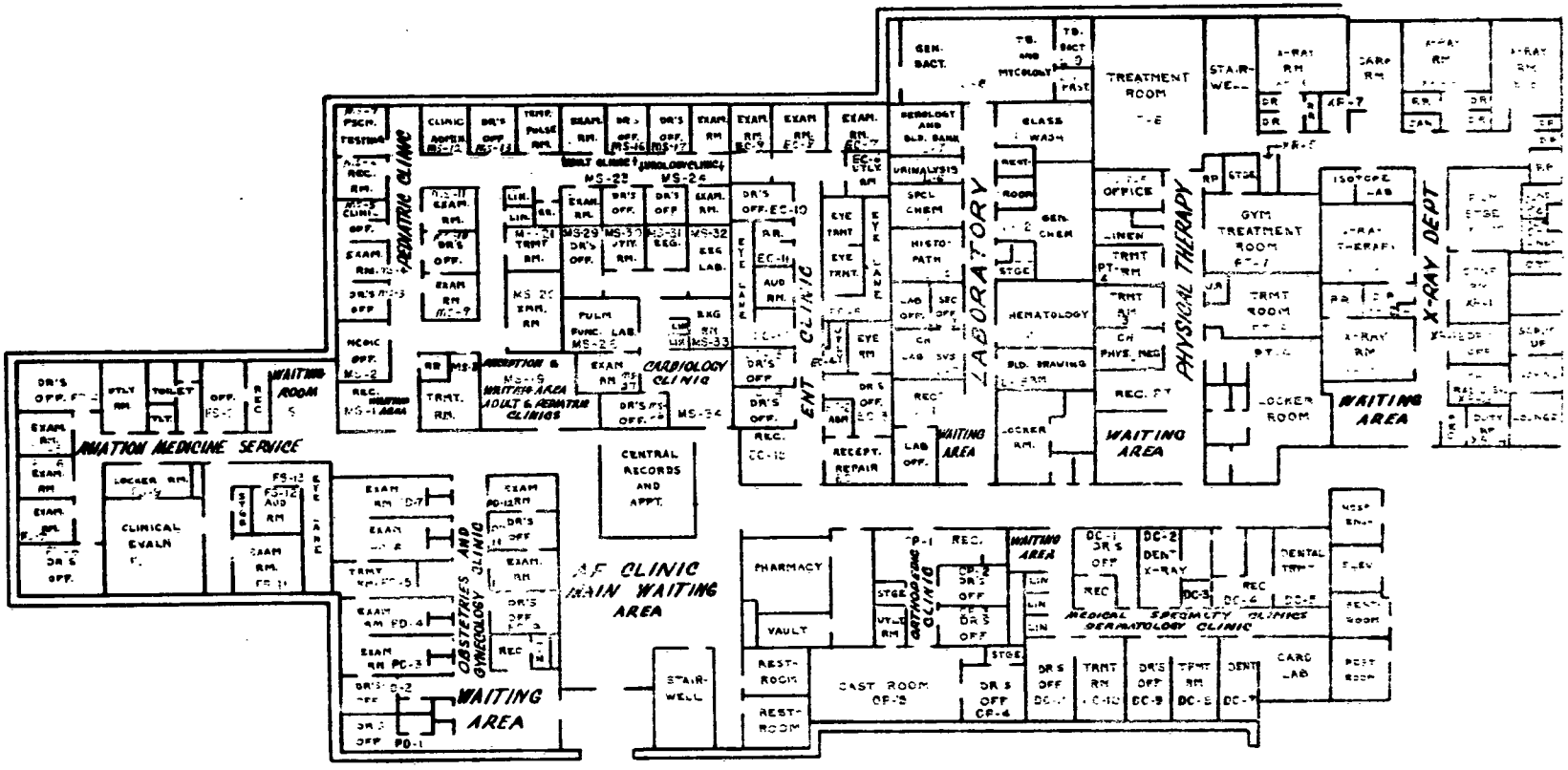
THE STUDY SETTING IS A 300-BED GENERAL ACUTE AIR FORCE TEACHING HOSPITAL LOCATED IN SOUTHERN ILLINOIS. THE BREAKDOWN OF AUTHORIZED BEDS IS THE FOLLOWING: GENERAL BEDS, 180; OBSTETRIC BEDS, 25; AND CONTAGION BEDS, 95. THIS AIR FORCE HOSPITAL IS A REGIONAL MEDICAL CENTER SERVICING THE GENERAL AREA OF THE NORTH MIDWESTERN UNITED STATES FOR CARE WHICH IS TOO SPECIALIZED FOR THE MANY SMALL AIR FORCE HOSPITALS IN THIS AREA. PATIENTS ARE TRANSPORTED FROM THE

SMALLER HOSPITALS TO THIS CENTER AND BACK BY AEROMEDICAL EVACUATION AIRCRAFT.

THIS HOSPITAL HAS BEEN DESIGNATED A PULMONARY DISEASE CENTER FOR THE AIR FORCE. AS A RESULT, MOST OF THE AIR FORCE ACTIVE DUTY PATIENTS AND THEIR DEPENDENTS WHO HAVE CONTRACTED TUBERCULOSIS ARE HOSPITALIZED HERE. THE MEDICAL STAFF NUMBERS FORTY-FIVE AND INCLUDES SPECIALISTS IN ALL FIELDS BUT NEUROSURGERY. APPROXIMATELY 5,300 PATIENTS ARE DISCHARGED ANNUALLY FROM INPATIENT TREATMENT. THE AIR FORCE CLINIC TREATS APPROXIMATELY 12,000 PATIENTS PER MONTH IN ITS INDIVIDUAL CLINICS. THIS NUMBER IS INCREASING EACH YEAR AND, BARRING A SUBSTANTIAL REDUCTION IN AIR FORCE MANPOWER, SHOULD CONTINUE TO INCREASE SUBSTANTIALLY IN THE SUCCEEDING YEARS.

THE AIR FORCE CLINIC OPERATION RESEMBLES A GROUP PRACTICE CLINIC IN A CIVILIAN COMMUNITY. IT SERVES A SOMEWHAT CONTROLLED NUMBER OF MILITARY ACTIVE DUTY AND RETIRED MEMBERS AND THEIR DEPENDENTS. BY ITS LOCATION THE PHYSICAL LAYOUT OF THE CLINIC ALLOWS FOR EFFICIENCY OF OPERATION. ALL OF THE CLINICS EXCEPT THOSE FOR GENERAL SURGERY AND PSYCHIATRY ARE LOCATED IN THE AIR FORCE CLINIC AREA, WITH THE ANCILLARY SERVICES IN CLOSE PROXIMITY. PATIENTS DO NOT HAVE TO WALK GREAT DISTANCES BETWEEN CLINIC AREAS AND ANCILLARY SERVICES, AND THE CHANCES OF BECOMING LOST ARE VERY SLIGHT (SEE FIGURE 1).

IN THE ORGANIZATIONAL STRUCTURE OF THE USAF HOSPITAL SCOTT, THE AIR FORCE CLINIC IS RESPONSIBLE TO THE DIRECTOR OF HOSPITAL SERVICES (SEE APPENDIX C, FIG 2). THE ADMINISTRATION OF THE



USAF HOSPITAL SCOTT

FIRST FLOOR PLAN

FIGURE 1

APPOINTMENT SYSTEM AND OF THE CLINICS THEMSELVES IS UNDER THE IMMEDIATE CONTROL OF AN AIR FORCE CLINIC MANAGER (SEE APPENDIX C, FIG 3). THE PHYSICIAN STAFF FOR EACH CLINIC IS PROVIDED BY THE CHIEFS OF THE THREE PROFESSIONAL DEPARTMENTS. THE DIRECTOR OF HOSPITAL SERVICES (COMPARABLE TO A CIVILIAN CHIEF OF STAFF) REPORTS DIRECTLY TO THE HOSPITAL COMMANDER OR MEDICAL DIRECTOR OF THE MEDICAL FACILITY (SEE APPENDIX C, FIG 1).

THEORY THIS ORGANIZATIONAL STRUCTURE PROVIDES FOR GOOD ADMINISTRATIVE CONTROL AND COMMUNICATION SO THAT INFORMATION CAN BE TRANSMITTED EITHER WAY QUICKLY AND EFFICIENTLY. THE PROFESSIONAL DEPARTMENTS HAVE INPATIENT AS WELL AS CLINIC RESPONSIBILITIES. THIS IS HOW A GROUP PRACTICE OPERATION MUST WORK TO PROVIDE CONTINUITY OF CARE. ADMINISTRATION MUST INSURE THAT EACH FUNCTION IS ADEQUATELY COVERED AT ALL TIMES AND THE CHIEFS OF THE PROFESSIONAL DEPARTMENTS MUST CARRY THE INITIAL RESPONSIBILITY FOR THIS COVERAGE.

E. <u>RESEARCH METHODOLOGY</u>.

AS AN ADMINISTRATIVE RESIDENT, THE AUTHOR SPENT MANY HOURS OBSERVING THE DIFFERENT OUTPATIENT CLINICS AS A CASUAL OBSERVER PRIOR TO HIS DECISION TO STUDY THE AIR FORCE CLINIC AND ITS OPERATION. A CARD WAS DEVISED TO ASSIST IN COLLECTING DATA AND BRING THE PATIENT INTO THE STUDY. IT WAS FELT THAT THE PATIENT, THE PHYSICIAN AND OTHER SUPPORTIVE PERSONNEL SHOULD BE BROUGHT INTO THE STUDY SO THAT MAXIMUM UNDERSTANDING OF THE PROBLEM WOULD BE GAINED BY ALL.

The 5" x 8" card was called a test form for the USAF Hospital Scott. This test form allowed the investigator to collect data for 120 days. The card was prenumbered by the administrative resident and a pretest of the form was conducted in the surgical clinic. The pretest showed some deficiencies in the card, which was redesigned and printed by means of a multilith.

The original plan was to study a minimum of four clinics, the Pediatric and Adult Clinics and two others of a more specialized nature. The General Surgical and Medical Clinics were chosen for this study. As things progressed the author decided also to collect data on the Medical Chest and Dermatology Clinics, which are located within the same area as the Medical Clinic. The Cardiology Clinic and the Urology Clinic became part of the study for the same reason.

The objective was to give to each patient who attended the clinic on study days the data card with his arrival time checked by the receptionist. The next entry would be the time that the nurse or medical technician saw the patient, if they did any preliminary work. Then the physician would mark the in and out times as indicated on the card for the time he spent with the patient. Additional lines were available for return entries if the patient was told to come back after some ancillary service.

The author was also interested in the amount of time the outpatients in the various clinics spent waiting in the ancillary services. Entries for each of the ancillary services were made

BY THEIR RECEPTIONISTS OR SERVICE PERSONNEL, GIVING AN ACCURATE NUMBER OF MINUTES EACH PATIENT HAD TO WAIT FOR SERVICE. THE LABORATORY AND X-RAY DEPARTMENTS USED A TIME CLOCK TO PUNCH THE VARIOUS TIMES ONTO THE DATA CARD. IN THE X-RAY DEPARTMENT IT WAS DECIDED TO MEASURE BOTH WAITING TIME AND SERVICE TIME, IF POSSIBLE, FOR PRELIMINARY OBSERVATIONS SHOWED THIS DEPARTMENT TO BE A BOTTLENECK IN THE AIR FORCE CLINIC OPERATION.

THE PATIENT WAS HANDED THIS CARD AS HE OR SHE REPORTED TO THE RECEPTIONIST IN THE INDIVIDUAL CLINIC AND RECEIVED INSTRUCTIONS FOR ITS USE. AFTER THE PHYSICIAN, THE NURSE OR THE TECHNICIAN INDICATED THEIR SERVICE TIMES, THE PATIENT WAS TOLD TO TAKE THE CARD TO THE VARIOUS ANCILLARY SERVICES HE OR SHE HAD TO VISIT AND LEAVE IT AT ONE OF THE THREE MAIN POINTS OF EGRESS FROM THE AIR FORCE CLINIC. AFTER IT WAS IN OPERATION FOR A FEW HOURS IN EACH CLINIC, THIS PARTICULAR SYSTEM PROVED HIGHLY SUCCESSFUL.

THE COOPERATION OF THE PHYSICIANS WAS OBTAINED BY PERSONAL CONTACT WITH EACH PHYSICIAN EXPLAINING THE PURPOSE OF THE STUDY, AND CLEARANCE WAS APPROVED BY EACH DEPARTMENT HEAD CONCERNED. THE PHYSICIANS RESPONDED WELL AND THE ACCURACY OF THEIR DATA IS ASSURED.

THE TIME PERIOD OF THE STUDY EXTENDED FROM 14 NOVEMBER 1962 THROUGH 30 JANUARY 1963. THE INVESTIGATOR TRIED TO SPEND ONE WEEK IN EACH OF THE CLINICS GATHERING DATA AND OBSERVING THE OPERATION OF THE CLINIC WHILE CHECKING ON THE ACCURACY OF THE DATA COLLECTED. ALTHOUGH THE DATA WAS COLLECTED DURING THE COLDER PART OF THE YEAR,

THE WORKLOAD CLOSELY APPROXIMATED THE AVERAGE PATIENT LOAD FOR THAT CLINIC ON A WEEKLY BASIS.

THE POPULATION AT RISK WERE ALL OUTPATIENTS SEEN IN THE VARIOUS CLINICS DURING THE STUDY PERIOD. THE STUDY PERIOD APPROXIMATED A ONE WEEK PERIOD OF CLINIC VISITS FOR EACH CLINIC. IF THE CARDS WERE NOT LEFT UPON DEPARTURE FROM THE CLINIC AREA OR THE PATIENT LOST THE CARD, THE RESULTS WERE NOT AVAILABLE FOR THESE CASES. IT HAD BEEN ESTIMATED THAT A NINETY PER CENT RETURN ON CARDS WOULD GIVE RELIABLE RESULTS. EACH OF THE VARIOUS CLINICS WAS COOPERATIVE AND OVER NINETY PER CENT OF THE CARDS WERE RETURNED; IN FACT, ONLY ONE CLINIC HAD A RETURN LESS THAN NINETY PER CENT.

THE NEXT STEP WAS TO COMPUTE THE INTERVAL OF TIME BETWEEN ARRIVAL AND APPOINTMENT TIME TO DETERMINE ARITHMETICALLY THE NUMBER OF MINUTES EARLY A PATIENT ARRIVED. THE SAME COMPUTATION BETWEEN APPOINTMENT TIME AND ARRIVAL TIME RESULTED IN MINUTES LATE FOR THOSE PATIENTS WHO ARRIVED AFTER THEIR APPOINTED TIME. THE TIME BETWEEN APPOINTED TIME AND TIME SEEN BY PHYSICIAN REVEALED THE WAITING TIME FROM APPOINTMENT OR TRUE WAITING TIME; AND THE TIME FROM ARRIVAL TO TIME SEEN BY PHYSICIAN REVEALED THE TOTAL WAITING TIME FROM ARRIVAL. WAITING TIMES AND SERVICE TIMES FOR THE ANCILLARY SERVICES WERE RECORDED AND ARITHMETICALLY DETERMINED.

ALL DATA COLLECTED WAS PUT ONTO PUNCH CARD TRANSCRIPT SHEETS AND THEN PUNCHED ONTO IBM PUNCH CARDS. SORTING OF THE PUNCH CARDS PRODUCED DIFFERENT FREQUENCIES FROM WHICH MEANS AND MEDIANS WERE DETERMINED. ALTHOUGH IT WAS ORIGINALLY PLANNED TO COLLECT DATA ON

1000 OR MORE PATIENTS, ONLY 900+ CARDS WERE COLLECTED DURING THE STUDY PERIOD. A TABLE SHOWING THE NUMBER OF CARDS GIVEN OUT AND RETURNED IS INCLUDED IN APPENDIX A-1.

F. GLOSSARY OF TERMS.

THIS GLOSSARY DEFINES THE TERMS USED IN THIS STUDY BY THE AUTHOR AND MAY NOT AGREE WITH THE DEFINITIONS USED BY OTHER WRITERS IN THE FIELD.

1. CLINIC VISIT.

A VISIT TO ANY ONE OF THE TWENTY-ONE CLINICS BY A PATIENT EITHER IN AN APPOINTMENT STATUS OR IN A WALK-IN STATUS, DURING WHICH TIME THE PATIENT IS SEEN BY ONE OR MORE PHYSICIANS.

2. APPOINTED PATIENT.

A PATIENT WHO HAS RECEIVED A DEFINITE APPOINTMENT TO SEE A PARTICULAR PHYSICIAN AT A CERTAIN TIME IN ANY ONE OF THE CLINICS.

3. WALK-IN PATIENT.

A PATIENT WHO DOES NOT HAVE AN APPOINTMENT AT THE PARTICULAR CLINIC HE IS VISITING, BUT WHO IS SEEN BY A PHYSICIAN IN THAT CLINIC ON A STANDBY STATUS. THIS MAY INCLUDE ACUTE MEDICAL EMERGENCIES AND PATIENTS WHO DO NOT FEEL THAT THEY CAN WAIT UNTIL AN APPOINTMENT CAN BE GIVEN TO THEM. THIS STATUS WILL ALSO INCLUDE THOSE PATIENTS WHO ARE REFERRED TO THE CLINIC BY OTHER PHYSICIANS WHO FEEL THEY SHOULD BE SEEN ON THAT PARTICULAR DAY.

4. ANCILLARY SERVICE.

ADJUNCT SERVICES WHICH INCLUDE RADIOLOGY, LABORATORY AND PHARMACY IN THIS STUDY. THESE ARE SERVICES TO WHICH CLINIC PATIENTS

ARE SENT AFTER VISITING THE PHYSICIAN EITHER FOR DIAGNOSTIC AIDS OR FOR MEDICATIONS.

5. Total Waiting Time.

The total amount of waiting time in minutes that a patient who visits a clinic waits from the time he reports to the reception desk in the clinic until he is initially seen by a physician. For appointed patients this will include the time they may arrive early; and for walk-in patients and late arrivals for appointments, the time from their arrival at the reception desk.

6. First Waiting Time.

This term is used to describe the amount of time an appointed patient waits from his arrival to the time of his appointment. This term can only be applied to patients who arrive on time or early for their appointments.

7. Second Waiting Time (True Waiting Time).

The amount of time a patient waits from his appointment time to the time he is initially seen by a physician in that clinic.

8. Chi-Square Test (X^2).

A test used to compare differences to determine if these differences are real or due to chance alone. A P or probability of 0.05 is used to determine significance.

9. Mean.

The arithmetical average of all the observations.

$$\text{MEAN} = \frac{\text{THE SUM OF ALL OBSERVATIONS}}{\text{NUMBER OF OBSERVATIONS}}$$

10. MEDIAN.

THE VALUE OR MAGNITUDE OF THE CENTRAL OR MIDDLE OBSERVATION WHEN ALL OBSERVATIONS ARE LISTED IN ORDER FROM LOWEST TO HIGHEST. FIFTY PER CENT OF THE OBSERVATIONS FALL BELOW THE MEDIAN AND FIFTY PER CENT LIE ABOVE THIS VALUE.

$$\text{MEDIAN} = \frac{N + 1}{2}$$

N = TOTAL NUMBER OF OBSERVATIONS

11. STANDARD DEVIATION (S.D.).

A MEASURE OF THE SCATTER OF THE OBSERVATIONS AROUND THEIR MEAN. THE MEAN +/-2 S.D. WILL INCLUDE 95.5% OF ALL OBSERVATIONS OR VALUES.

CHAPTER II. ANALYSIS OF DATA

A. Analysis of General Attendance Data.

Data was collected on each patient seen in the eight clinics studied during the study period. The data card recorded arrival times, service times and departure times at each clinic and each ancillary service visited. An analysis of the waiting times and service times revealed that the clinic operation involved two sub-systems operating under the general or major system known as the Air Force Clinic.

The first of these two sub-systems involves the waiting time and service time of a patient after his arrival in the individual clinic. The second sub-system is comprised of the waiting and service times of a patient at one or more of the ancillary services he may visit. In theory one hundred per cent of the patients will see a physician, but only a small percentage of these will visit one or more of the ancillary services. The total number of patients in each category seen by a physician in the eight clinics and the cancellation rate per clinic is given in the following table:

TABLE 1

Number of Patients Seen by Physicians in Clinics by Category, Percentage of Walk-Ins and Cancellations						
Clinic	No of Appt	No of Walk-Ins	Totals	% of Walk-Ins	Canc's	% of Canc's
Gen Surg	91	29	120	24.2	14	15.4
Adult	134	69	203	33.9	11	8.2
Pediatrics	132	185	317	58.4	27	20.5
Medical	36	3	39	7.7	8	22.2
Med Chest	45	1	46	2.2	5	11.1
Cardiology	24	14	38	36.8	3	12.5
Urology	53	4	57	7.0	8	15.1
Dermatology	25	22	47	46.8	1	4.0
Totals	540	327	867	37.7	77	14.3
% of Total	62.3%	37.7%	100%			

These figures show that there are only 24.6 per cent more patients seen in an appointed status than in a walk-in status. This information by itself is valuable for planning an appointment system, for it indicates that provisions for many walk-in patients will have to be built into the appointment system; otherwise it could not function properly.

The Pediatric Clinic experiences the highest percentage of walk-ins. The Adult Clinic is faced with this phenomenon on a smaller scale. In both of these clinics there appears to be a

STAFFING PROBLEM. THE LARGE PERCENTAGE OF WALK-IN PATIENTS WOULD BE AN INDICATION THAT THERE ARE SO MANY PATIENTS WHO CANNOT WAIT FOR A REGULAR APPOINTMENT THAT THEY JUST WALK IN FOR MEDICAL ATTENTION. THE APPOINTMENT SYSTEM IS, IN EFFECT, NOT ABLE TO TAKE CARE OF THE NUMBERS OF PATIENTS, POSSIBLY DUE TO LACK OF SUFFICIENT PHYSICIAN STAFFING IN THESE TWO AREAS.

THE CANCELLATION RATE FOR ALL CLINICS IS 14.4 PER CENT WITH A RANGE FROM A LOW OF 4 PER CENT IN DERMATOLOGY TO A HIGH OF 22.2 PER CENT IN THE MEDICAL CLINIC. THIS IS ANOTHER IMPORTANT RATE TO KNOW, FOR BY KNOWING IT WE CAN PLAN FOR OTHER ACTIVITIES FOR CLINIC PERSONNEL OR ASSIGN THAT INTERVAL TO WALK-IN PATIENTS.

THE AIR FORCE CLINIC AT THE STUDY HOSPITAL OPERATES UNDER A CENTRAL APPOINTMENT SYSTEM WHICH CONTROLS ALL INITIAL AND FOLLOW-UP APPOINTMENTS FOR ALL PATIENTS. THIS OFFICE IS LOCATED PHYSICALLY WITHIN THE MAIN CLINIC WAITING ROOM AREA (SEE PICTURE 1, APPENDIX B). THE MEDICAL RECORDS FOR ALL CLINIC PATIENTS ARE ALSO LOCATED AND MAINTAINED IN THIS SAME AREA (SEE PICTURE 2, APPENDIX B).

THE ADULT CLINIC IS USED AS A GENERAL PRACTICE CLINIC WHERE ALL ADULT PATIENTS ARE EITHER TREATED ON A CONTINUING BASIS OR REFERRED TO ONE OF THE SPECIALTY CLINICS AVAILABLE. THE PEDIATRIC CLINIC OPERATES IN THE SAME MANNER FOR CHILDREN UNDER FOURTEEN YEARS OF AGE.

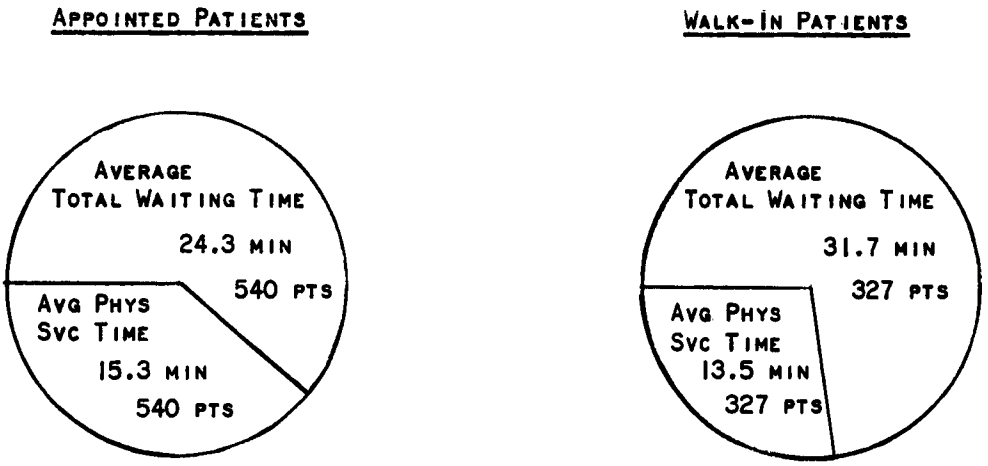
B. <u>ANALYSIS OF TOTAL WAITING TIME AND PHYSICIAN SERVICE TIME</u>.

THE COMPUTATION OF DATA COLLECTED FROM ALL PATIENTS REVEALS THAT, ON THE AVERAGE, APPOINTED PATIENTS HAVE TO WAIT 24.3 MINUTES BEFORE BEING SEEN BY A PHYSICIAN AND THEIR AVERAGE SERVICE TIME

BY A PHYSICIAN IS 15.3 MINUTES. A WALK-IN PATIENT WAITS A TOTAL OF 31.7 MINUTES ON THE AVERAGE AND HAS A SERVICE TIME OF 13.7 MINUTES ON THE AVERAGE. THE FOLLOWING PIE DIAGRAMS DESCRIBE THIS DATA:

FIGURE 2

AVERAGE TOTAL WAITING TIME AND PHYSICIAN SERVICE TIME FOR ALL PATIENTS BY CATEGORY



THESE DIAGRAMS SHOW VERY CLEARLY THAT THE AVERAGE WALK-IN PATIENT HAS ONLY A SLIGHTLY LONGER WAIT TO SEE A PHYSICIAN THAN DOES AN APPOINTED PATIENT. HE ALSO SPENDS ALMOST AS MUCH TIME WITH THE PHYSICIAN ON THE AVERAGE (A DIFFERENCE OF ONLY 1.8 MINUTES). THE 7.4 MINUTES LONGER OF WAITING TIME WOULD NOT, IF IT WERE KNOWN, DISCOURAGE PATIENTS FROM JUST WALKING IN WITHOUT TRYING TO RECEIVE AN APPOINTMENT. APPOINTED PATIENTS HAVE TO WAIT A MINIMUM OF TWO DAYS FOR AN APPOINTMENT AND, IN SOME CLINICS, AS MUCH AS TWO OR THREE WEEKS BEFORE BEING SEEN BY A PARTICULAR PHYSICIAN. THE WALK-IN DOES NOT SEEM TO BE AT A DISADVANTAGE IN EITHER TOTAL WAITING

TIME OR SERVICE TIME AS REPRESENTED BY AVERAGE FIGURES FOR THESE CLINICS. HE IS AT NO REAL DISADVANTAGE AT ALL, EXCEPT THAT HE IS NOT PERMITTED HIS CHOICE OF PHYSICIAN.

C. ANALYSIS OF WAITING AND SERVICE TIMES AT ANCILLARY SERVICES (SUB-SYSTEM II).

AFTER A PATIENT IS SEEN BY A PHYSICIAN, HE MAY BE TOLD TO VISIT ONE OR MORE ANCILLARY SERVICE. THE FOLLOWING TABLE WILL REVEAL THE NUMBERS AND PERCENTAGES OF THE TOTAL POPULATION WHO VISITED ONE OR MORE ANCILLARY SERVICE:

TABLE 2

NUMBER AND PERCENTAGE OF ALL PATIENTS WHO VISITED ONE OR MORE ANCILLARY SERVICE								
ANCILLARY SVS	PHARM	LAB	X-RAY	PHARM & LAB	PHARM & X-RAY	LAB & X-RAY	LAB X-RAY PHARM	TOTALS
NUMBER OF PATIENTS	245	34	18	48	5	10	0	360
PERCENTAGE OF TOTAL NO	28.3%	3.9%	2.1%	5.5%	0.6%	1.2%	0%	41.5%

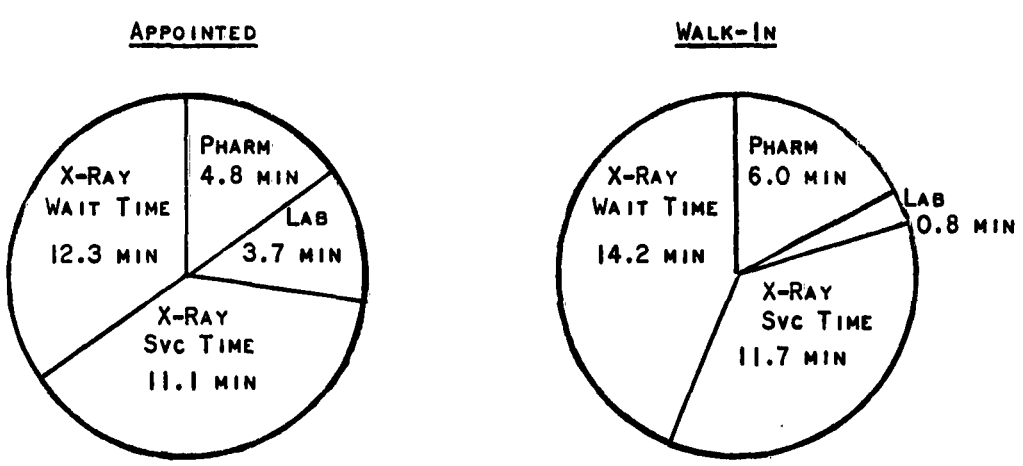
APPT = NO/540; W-I = NO/327

ONLY 41.5 PER CENT OF THE PATIENTS WHO VISITED THE CLINICS DURING THE STUDY PERIOD VISITED ONE OR MORE ANCILLARY SERVICE; 58.5 PER CENT WERE FREE TO LEAVE THE CLINIC AFTER VISITING THE PHYSICIAN. AS MIGHT BE EXPECTED THE MAJORITY OF THOSE PATIENTS WHO GO ON TO THE ANCILLARY SERVICES ARE SENT TO PHARMACY. A BREAKDOWN BY CLINICS IS AVAILABLE IN APPENDIX A-2.

THE FOLLOWING PIE DIAGRAMS DEMONSTRATE WHAT HAPPENS TO A PATIENT IN MINUTES OF TIME AT EACH OF THE ANCILLARY SERVICES:

FIGURE 3

BREAKDOWN OF WAITING AND SERVICE TIMES OF ANCILLARY SERVICES ON THE AVERAGE FOR ALL CLINIC PATIENTS



THE TIMES SHOWN FOR THE LABORATORY AND PHARMACY ARE WAITING AND SERVICE TIMES. THIS MEANS THE TIME NECESSARY TO PROCESS THE PRESCRIPTIONS FOR THE PATIENTS ON THE AVERAGE AND THE TOTAL TIME NEEDED TO OBTAIN A SAMPLE FROM THE PATIENT IN THE LABORATORY, AND DOES NOT INCLUDE THE PROCESSING TIME OF THE SAMPLE ITSELF. THE AUTHOR CONSIDERS THE AVERAGE TIMES PRESENTED IN THIS DIAGRAM TO BE SHORT AND REASONABLE WAIT TIMES, AN INDICATION OF FAST AND EFFICIENT SERVICE IN THESE SERVICES. THE X-RAY TIMES, ALTHOUGH NOT HIGH IN TERMS OF ABSOLUTE NUMBERS, CERTAINLY POINTS TO AN AREA WHERE SOME EFFORT COULD BE MADE TO REDUCE THE TIME SPENT WAITING.

These differences in wait and service times between appointed and walk-in patients the author cannot explain. In theory there is no difference in the handling of the two categories of patients in the ancillary services, for in these services it is not known whether they are one or the other.

The diagram and table above further prove that the major portion of their waiting and service time patients spend in the individual clinics. As a result of this, concentrated effort will be made in this area.

D. Analysis of Service Time by Physicians (Sub-System 1).

To operate an individual appointment system, it is important that appointment intervals be regulated to the average time a physician spends with all patients. The results of the computation of the data collected in this area are given below in Table 3.

TABLE 3

Physician Service Time on the Average and Appointment Intervals per Clinic

Clinic	Physician Svc Time Appt Pts Mean (min)	Med	Appointment Intervals (min) New Pts	Old Pts	Physician Svc Time W-I Pts Mean (min)	Med
Gen Surg	9.3	7.8	10	10	8.4	7.2
Adult	12.6	14.3	15	15	13.5	12.7
Pediatric	16.3	14.9	15	15	13.5	12.8
Medical	23.3	20.3	60	15	15.0	14.9
Med Chest	22.4	20.6	30	15	12.0	12.0
Cardiology	28.0	19.7	30	30	19.1	18.8
Urology	13.5	13.9	60	10	14.0	17.5
Dermatology	13.6	9.9	10	10	17.6	17.5
Total Avg	15.3				13.5	

THE SERVICE TIME COMPUTED FOR EACH CLINIC GENERALLY BEARS A CLOSE RELATIONSHIP TO THE APPOINTMENT INTERVAL ESTABLISHED BY EACH CLINIC. THE PEDIATRIC SERVICE TIME EXCEEDS THE INTERVAL BY 1.3 MINUTES AND SOME CONSIDERATION SHOULD BE GIVEN TO INCREASING THIS INTERVAL. THE MEDIAN SERVICE TIME IN BOTH THE PEDIATRIC AND ADULT CLINICS APPROXIMATES THE APPOINTMENT INTERVAL, BUT IN THE ADULT CLINIC THE MEAN OR AVERAGE SERVICE TIME IS 2.4 MINUTES LESS THAN THE INTERVAL. THE APPOINTMENT INTERVAL WOULD NOT ALLOW FOR ALL PATIENTS GIVEN APPOINTMENTS IN THE PEDIATRIC CLINIC TO BE SEEN DURING APPOINTMENT HOURS IF ALL PATIENTS SHOWED UP FOR THEIR APPOINTMENTS.

NO ATTEMPT WAS MADE DURING THIS STUDY TO DIFFERENTIATE BETWEEN OLD OR NEW PATIENTS, WHICH IS A LIMITING FACTOR IN ANALYZING THIS DATA. GENERALLY, IT MAY BE SAID THAT THE APPOINTMENT INTERVALS AND THE AVERAGE SERVICE TIME ARE IN AGREEMENT EVERYWHERE BUT IN PEDIATRICS AND DERMATOLOGY. FURTHER STUDIES COULD BE MADE IN THESE AREAS TO DETERMINE WHETHER THE APPOINTMENT INTERVAL SHOULD BE INCREASED IN BOTH CLINICS. THE MEAN AND MEDIAN PHYSICIAN SERVICE TIMES AND STANDARD DEVIATIONS FOR EACH CLINIC ARE PRESENTED IN APPENDIX A-3.

E. ANALYSIS OF WAITING TIMES (SUB-SYSTEM I).

EXAMINATION OF THE WAITING TIME DATA DISCLOSED THAT IT IS MADE UP OF TWO CLASSIFICATIONS--WAITING TIME BEFORE APPOINTMENT (CALLED FIRST WAITING TIME) AND WAITING TIME FROM APPOINTMENT TIME (CALLED SECOND WAITING TIME) OR TRUE WAITING TIME. ONLY THE EARLY ARRIVALS FOR APPOINTMENTS EXPERIENCE THE FIRST WAITING TIME, WHICH

IN THIS STUDY INCLUDED 64.3 PER CENT OF THE PATIENTS ATTENDING THE CLINICS. AN ADDITIONAL 15.3 PER CENT OF THE PATIENTS ARRIVED EXACTLY ON TIME LEAVING A TOTAL OF 20.4 PER CENT OF THE PATIENTS LATE FOR THEIR APPOINTMENTS. THIS COMBINATION OF EARLY AND LATE ARRIVALS HAS ITS EFFECT ON THE APPOINTMENT SYSTEM WHICH WILL BE FURTHER DISCUSSED IN A LATER SECTION OF THIS ESSAY.

THE FOLLOWING TABLE SHOWS THE NUMBER AND PERCENTAGES OF EARLY AND LATE ARRIVALS BY CLINIC AND THE NUMBER SEEN BEFORE THEIR APPOINTMENT TIME:

TABLE 4

NUMBER OF PATIENTS EARLY, LATE AND ON TIME BY CLINIC AND PERCENTAGE OF TOTAL PATIENTS BY CLINIC

	No. Early	% of Total	No. Late	% of Total	On Time	% of Total	No. Seen Before Appt	% Seen Before Appt % of Col 2
Gen Surg	51	56.0	22	24.2	18	19.8	21	41.1
Adult	92	68.6	27	20.1	15	11.3	20	21.7
Ped	77	58.3	27	20.5	28	21.2	13	22.5
Med	25	69.4	8	22.2	3	8.4	4	16.0
Med Chest	31	68.8	7	15.5	7	17.7	7	22.6
Cardio	20	80.0	3	12.0	2	8.0	6	30.0
Urology	36	67.9	9	17.0	8	15.1	12	33.3
Derm	15	62.5	7	20.8	2	17.7	3	20.0
Average Total	347	64.3	110	20.3	83	15.4	86	24.8

In general the table discloses that many people are seen before their appointment time because they have arrived early. This is particularly true in the General Surgery Clinic where 41 per cent of the early arrivals are seen before their appointed time.

Early arrivals experience an initial or First Waiting Time which is of their own making, so to speak. The data collected shows that those who arrived early (347 patients) have an average First Waiting Time of 18.0 minutes for all attendances at clinics. Patients in the Urology Clinic have the high average of 19.2 minutes followed closely by General Surgery patients with 14.8 minutes with a low of 8.3 minutes in the Dermatology Clinic. The table in Appendix A-4 demonstrates the First and Second Waiting Times as compared to the total waiting time for all clinics.

Hospital administration should be concerned with First Waiting Times only when it becomes apparent that this factor results in crowded waiting rooms or has some affect on the appointment system for all patients. The small waiting areas in the clinics would not provide for a large number of patients (see Pictures 3, 4, 5, 6, 7, 8, 9 and 10, Appendix B). The primary concern in waiting times should be the time a patient waits from his appointment time to the time he is first seen by a physician. In this study we call this interval the Second Waiting Time or, more properly, True Waiting Time. The average or mean and median True Waiting Times for all clinics are shown in Table 5.

TABLE 5

Comparison of True Waiting Times and Total Waiting Times for Appointed Patients in All Clinics				
Clinic	True Waiting Time (minutes)		Total Waiting Time (minutes)	
	Mean	Median	Mean	Median
Gen Surg	17.7	12.7	22.3	15.8
Adult	11.8	10.1	18.6	17.2
Pediatric	25.7	21.8	30.3	27.8
Medical	19.3	16.5	27.4	26.9
Med Chest	25.1	23.8	35.2	32.5
Cardiology	13.6	7.5	20.9	18.1
Urology	11.7	9.9	18.5	16.7
Dermatology	20.7	24.9	24.5	24.9
Avg Total	18.0		24.3	

Hypothesis 2 assumed that patients in each clinic waited on the average fifteen minutes or less after their appointment time to see a physician. This hypothesis only concerns itself with appointed cases. Table 5 shows that only patients in three of the clinics--Adult, Cardiology and Urology--experience an average True Waiting Time of less than fifteen minutes. If one used median values there would be four. The author feels the hypothesis is disproven but is inclined to used median values rather than average mean values. In any appointment system, there is inevitably a patient who

BECOMES "LOST" OR OVERLOOKED IN THE WAITING ROOM. THIS RESULTS IN A WAITING TIME PERIOD THAT IS EXTREMELY HIGH (180 MINUTES IN ONE CLINIC). THIS ONE, OR SOMETIMES MORE THAN ONE, HIGH FIGURE WILL DISTORT THE AVERAGE SO MUCH THAT THE MEDIAN VALUE IS A MORE ACCURATE ESTIMATE OF THE AVERAGE VALUE.

THE TRUE WAITING TIME MEDIAN VALUES FOR PEDIATRICS, MEDICAL CHEST AND DERMATOLOGY, ALTHOUGH NOT TOO EXCESSIVE, ARE AREAS WHERE CONCENTRATED EFFORT COULD BE MADE TO REDUCE THESE FIGURES. THE MEDICAL CHEST CLINIC MEDIAN VALUE COULD BE REDUCED SOMEWHAT BY PROMPT ATTENDANCE BY PHYSICIANS IN THE CLINIC. THE PEDIATRIC CLINIC APPEARS TO HAVE PRIMARILY A STAFFING PROBLEM. THE DERMATOLOGY CLINIC COULD REDUCE THE NUMBER OF WALK-INS AND REQUIRE APPOINTMENTS FOR ALL RETURN VISITS, IF NOT FOR ALL VISITS, AND POSSIBLY REDUCE WAITING TIME FOR APPOINTED PATIENTS.

IN HYPOTHESIS I WE ASSUMED THAT PATIENTS IN THE ADULT AND PEDIATRIC CLINICS WITH APPOINTMENTS EXPERIENCED THE SAME WAITING TIME AS DO PATIENTS IN THE MEDICAL AND SURGICAL SPECIALTY CLINICS. TO REFINE THIS HYPOTHESIS FURTHER, THE AUTHOR FELT THAT THIS STUDY SHOULD BE CONCERNED WITH DIFFERENCES IN TRUE WAITING TIMES RATHER THAN TOTAL WAITING TIME. A COMPARISON OF THE ADULT AND PEDIATRIC CLINICS WITH THE OTHER SPECIALTY CLINICS WAS MADE WITH THE COMBINED MEDIANS OF THE TRUE WAITING TIMES. THE RESULTS OF THIS TEST USING THE .05 LEVEL FOR SIGNIFICANCE UNDER THE CHI-SQUARE TEST ARE SHOWN BELOW IN TABLES 6 AND 7. (VALUES USED FOR X^2 TESTS ARE IN APPENDIX A-5.)

TABLE 6

Results of X^2 Tests for Significance Adult Clinic vs Medical and Surgical Specialties			
Clinics	True Waiting Time Median (minutes)	X^2 Value	Significance Yes/No
Adult	10.1		
Gen Surg	12.7	1.01	No
Medical	16.5	3.52	No
Med Chest	23.8	5.21	Yes
Cardiology	7.5	0.71	No
Urology	9.9*		
Dermatology	24.9	5.90	Yes

*(Experience of only one patient -- X^2 not done.)

TABLE 7

Results of X^2 Tests for Significance Pediatric Clinic vs Medical and Surgical Specialties			
Clinics	True Waiting Time Median (minutes)	X^2 Value	Significance Yes/No
Pediatrics	21.8		
Gen Surg	12.7	5.11	Yes
Medical	16.5	2.26	No
Med Chest	23.8	0.46	No
Cardiology	7.5	7.09	Yes
Urology	9.9	7.70	Yes
Dermatology	24.9	0.20	No

In comparing the Adult Clinic with the specialty clinics, the author found that only the Medical Chest and Dermatology Clinics showed significant differences, although the difference in the Medical Clinic does approach significance. This means that patients in these clinics wait on the average a significantly longer period of time than those in the Adult Clinic. In comparing the Pediatric Clinic with the specialty clinics, one finds that patients in the General Surgery, Cardiology and Urology Clinics have a significantly shorter wait time than do patients in the Pediatric Clinic. The net result is that there are significantly different waiting times in five of the twelve comparisons and, therefore, the hypothesis is disproven. The True Waiting Time for patients in the general practice clinics is not the same as in the medical and surgical specialty clinics.

Hypothesis 3 concerns itself with the proportion of walk-in patients compared to appointed patients. The hypothesis assumes that there is no difference between the Adult and Pediatric Clinics' proportions and those in the specialty clinics. Table 8 shows the results of X^2 tests for significance for this comparison:

TABLE 8

Significance Tests for Differences in Proportion of Walk-Ins to Appointed Patients				
Clinics	Adult vs		Pediatric vs	
	X^2 Value	Yes/No	X^2 Value	Yes/No
Gen Surg	3.4	No	40.7	Yes
Medical	10.8	Yes	35.7	Yes
Med Chest	18.7	Yes	50.7	Yes
Cardiology	0.1	No	18.7	Yes
Urology	16.0	Yes	50.9	Yes
Dermatology	2.7	No	10.1	Yes

(Values used for X^2 test in Appendix A-6.)

The table clearly demonstrates the significantly higher proportion of walk-in patients in Pediatrics as compared to all specialty clinics. This is not quite the case in the Adult Clinic. Proportionately, there are approximately the same number of walk-ins in the Cardiology, Dermatology and General Surgery Clinics as there are in the Adult Clinic. This is somewhat surprising because the Adult Clinic is used as a screening clinic; and, theoretically, the number of walk-in patients should be somewhat lower in the specialty clinics. The high percentage of walk-ins in Dermatology can be explained by the fact that the physician encourages patients to come to the clinic anytime they need medical advice. This procedure seems to satisfy the patients but, as we have seen in Table 5, results in long waiting times for appointed patients.

Cardiology Clinic accommodates many walk-ins, but from observation the author knows that these are old patients who return at the moment they notice any cardiac symptoms. This procedure is in keeping with quality medical care for patients. The only explanation that can be offered for the number of walk-ins at the General Surgery Clinic is the number of trauma cases who appear during clinic hours. The findings in the Pediatric Clinic were to be expected. The large percentage of walk-ins (58%) in this clinic makes if difficult, if not impossible, to use the appointment system effectively. The long True Waiting Time of an average of 25.7 minutes further demonstrates the inability of the appointment system to cope with the number of walk-ins. If it were not for the overwhelming advantages of individual physicians for patients, continuity of patient care, and the privilege of choosing an appointment time, it would seem advisable in this clinic only to consider returning to the sick call method of attending patients. However, because of these distinct advantages, which the author feels are necessary to insure quality patient care, it would seem advisable to consider assigning more physicians to this clinic to take care of the workload. (See Appendixes A-6 and A-7 for Chi-square determinations.)

Few studies have been made in the United States which would permit comparison of data. The only study that we know of at this time is one done by David Balise at the Worcester City Hospital in Worcester, Massachusetts. For comparison only, results of similar (in name, anyway) clinics are compiled in Table 9.

TABLE 9

Comparison of Total Waiting Times Experienced by Patients at the Worcester City Hospital and USAF Hospital Scott		
Mean Total Waiting Times (in minutes)		
Clinic	USAF Hospital Scott	Worcester City Hosp
General Surgery	22.3	53.3
Pediatric	30.3	57.0
Medical	27.4	64.0
Cardiology	20.9	81.1
Urology	18.5	105.3
Dermatology	24.5	41.1

These results are for appointed patients in both hospitals, but no attempt has been made to differentiate either by patient characteristics or diagnosis.

The average Total Waiting Time experienced by all clinic patients was brought out in the pie diagrams on page 20. An examination of this figure for each clinic is presented in Table 10. Refer to Appendix A-8 for Chi-square determinations. The .05 level for significance in the Chi-square test was used.

TABLE 10

Comparison of Average Total Waiting Times (minutes) for Appointed and Walk-In Patients by Clinic and Significance Test				
Clinic	Appointed Patients	Walk-In Pts	X^2 Value	Significance Yes/No
Gen Surgery	22.3	21.2	0.1	No
Adult	18.6	31.1	15.7	Yes
Pediatric	30.3	45.6	17.8	Yes
Medical	27.4	33.0	3.2	No
Med Chest	35.2	49.0*		
Cardiology	20.9	11.9	4.1	Yes
Urology	18.5	45.0	4.5	Yes
Dermatology	24.5	19.1	1.1	No

*(Experience of only one patient -- X^2 not done.)

The results show that walk-in patients have a significantly longer Total Waiting Time in the Adult, Pediatric and Urology Clinics; whereas Cardiology walk-in patients experience a significantly shorter wait than do appointed patients. Due to the inadequate (only one patient) size of the walk-in classification for the Medical Chest Clinic, no tests for significance were done. The results seem to indicate that walk-in patients experience a longer wait in the Adult and Pediatric Clinics than they do in the specialty clinics. It became obvious when all the data was examined that there were some factors influencing the appointment system which were not originally hypothesized. The author decided to investigate other data to discover these factors.

CHAPTER III. DESCRIPTION OF PATIENT ARRIVALS TO THE APPOINTMENT SYSTEM

TABLE 4 INDICATED THERE WERE A HIGH PERCENTAGE OF EARLY ARRIVALS FOR APPOINTMENTS AND A SMALL PERCENTAGE OF LATE ARRIVALS. TO DETERMINE WHAT EFFECT THIS HAS ON THE APPOINTMENT SYSTEM, IT WAS DECIDED TO DETERMINE THE ARRIVAL INTERVALS OF PATIENTS AT ONE CLINIC. THE ARRIVAL TIME OF EACH PATIENT AT THE ADULT CLINIC FOR THE STUDY PERIOD (1 WEEK) WAS NOTED AND THE INTERVAL BETWEEN ARRIVALS DETERMINED. THE RESULTS WERE BROKEN DOWN INTO A FREQUENCY DISTRIBUTION IN INTERVALS OF FIVE MINUTES, AND FROM THIS A PROBABILITY CURVE WAS PLOTTED ON GRAPH PAPER. THE CURVE PLOTTED FROM THE ARRIVAL DATA GATHERED FROM THE ADULT CLINIC DEMONSTRATED QUITE CONCLUSIVELY A NEGATIVE EXPONENTIAL DISTRIBUTION OF ARRIVAL INTERVALS. THIS INDICATES THAT WE HAVE A RANDOM INPUT OF ARRIVALS TO THE SYSTEM (SEE FIGURE 4). WITH SUCH A RANDOM INPUT, IT IS IMPOSSIBLE TO PREDICT WHETHER AN APPOINTED OR WALK-IN PATIENT WILL ARRIVE NEXT IN THE CLINIC.

THIS PHENOMENON IS NOT TO BE EXPECTED IN AN APPOINTMENT SYSTEM THAT HAS INDIVIDUAL PHYSICIAN APPOINTMENTS WITH SPECIFIC APPOINTMENT TIMES. ONE WOULD THINK THAT PATIENTS (EXCEPT WALK-INS) WOULD ARRIVE AT APPROXIMATELY THE APPOINTMENT INTERVAL TIMES (E.G., EVERY 15 MINUTES). THIS RANDOM EFFECT IS THE RESULT OF SO MANY EARLY ARRIVALS, MANY OF WHOM ARE SEEN BEFORE THEIR APPOINTMENT, AND

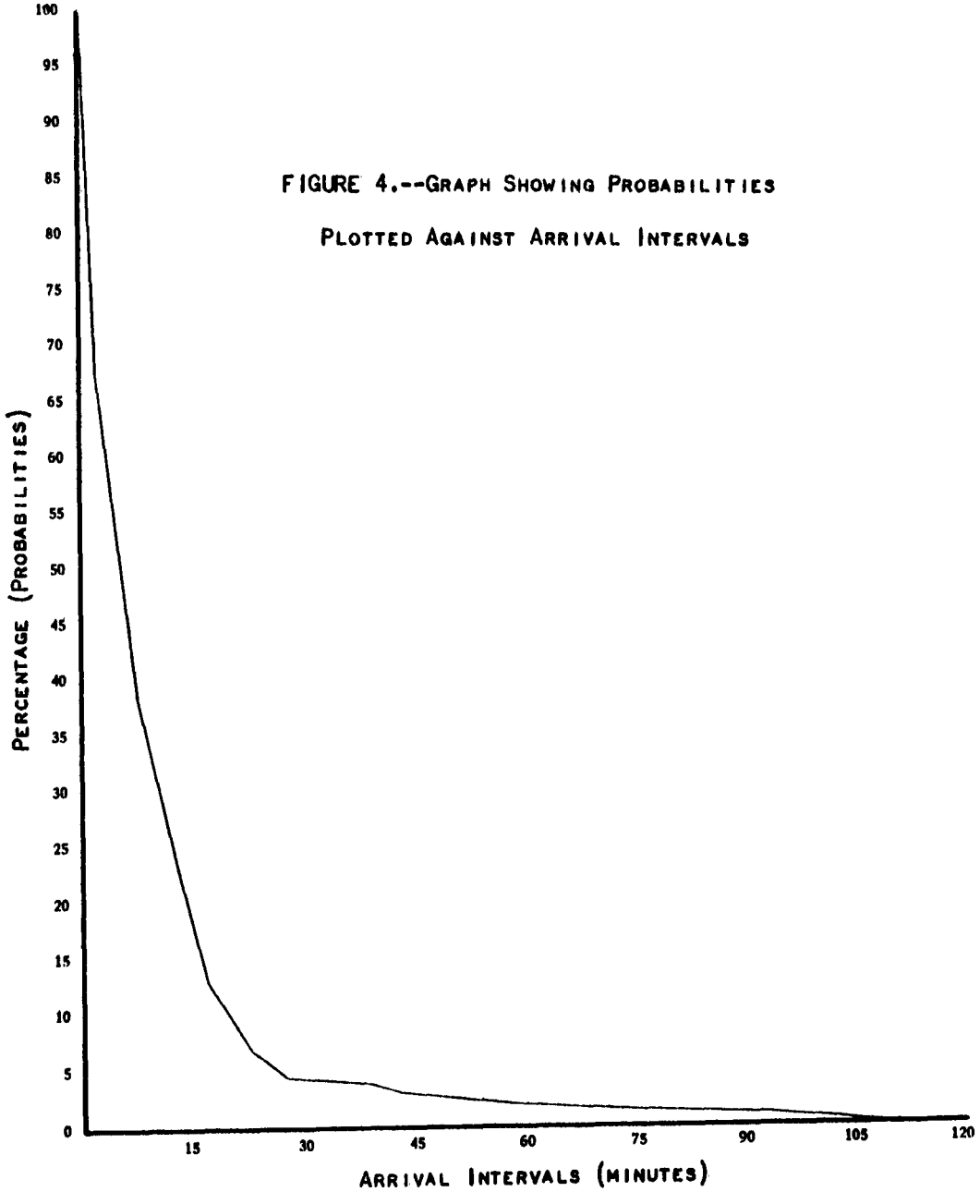


FIGURE 4.--GRAPH SHOWING PROBABILITIES PLOTTED AGAINST ARRIVAL INTERVALS

LATE ARRIVALS WHO ARE SEEN SOON AFTER ARRIVAL, COMBINED WITH THE ARRIVAL OF WALK-IN PATIENTS WHO COME TO THE CLINIC RANDOMLY.

FURTHER EXAMINATION OF THE DATA IN THE ADULT CLINIC SHOWED THAT WE ARE WORKING WITH A COMBINATION OF A SINGLE CHANNEL SERVICE SYSTEM AND A MULTIPLE CHANNEL SERVICE SYSTEM. THE WALK-IN PATIENTS RECEIVE SERVICE FROM EITHER OF TWO PHYSICIANS PRESENT, WHEREAS THOSE WITH APPOINTMENTS WAIT FOR THE DOCTOR OF THEIR CHOICE. IF THIS WERE EITHER A SINGLE CHANNEL SERVICE SYSTEM OR A MULTIPLE CHANNEL, BUT NOT A COMBINATION OF THE TWO, THE DATA COULD BE DEMONSTRATED BY A MATHEMATICAL MODEL. THIS MODEL COULD THEN DESCRIBE THE DATA AND BE SET UP TO ALLOW FOR VARIATIONS IN ADMINISTRATIVE DECISIONS SO AS TO TEST RECOMMENDATIONS FOR CHANGE BEFORE IMPLEMENTATION; ONE MUST REMEMBER THAT THIS MODEL COULD BE USED ONLY IF THE ARRIVAL INTERVALS WERE RANDOM. UNDER THE PRESENT APPOINTMENT SYSTEM, THE DATA SHOWS THAT THE AVERAGE TOTAL WAIT TIME FOR LATE ARRIVALS FOR ALL CLINICS IS SIGNIFICANTLY LESS THAN THE TOTAL WAIT TIME FOR EARLY ARRIVALS FOR APPOINTMENTS (REFER TO APPENDIX A-9). THE LATE ARRIVALS ARE SEEN IN A SHORTER PERIOD OF TIME THAN ARE THE INDIVIDUALS WHO COME EARLY FOR THEIR APPOINTMENTS. THIS TENDS TO PENALIZE THE EARLY ARRIVALS AND REWARD THE LATE ARRIVALS; THE LATE ARRIVAL SEEMS TO BE ENJOYING AN ADVANTAGE IN WAITING TIME WHILE RECEIVING THE SAME AMOUNT OF PHYSICIAN TIME.

THE HIGH PERCENTAGE OF EARLY ARRIVALS INDICATES THAT THEIR STRATEGY IS TO ARRIVE EARLY WITH THE HOPES OF BEING SEEN EARLY; MOST OF THE TIME THIS STRATEGY FAILS AND THE CORRECT STRATEGY WOULD HAVE

BEEN TO ARRIVE LATE. BUT HOSPITAL ADMINISTRATION COULD NOT PERMIT A HIGH PERCENTAGE OF LATE ARRIVALS EITHER, OR THE APPOINTMENT SYSTEM WOULD FAIL.

A SIMULTANEOUS STUDY CONDUCTED DURING THE SAME TIME PERIOD AT ANOTHER AIR FORCE MEDICAL FACILITY REVEALED SOME DIFFERENCES IN WAITING TIMES, BUT THE OUTSTANDING SIMILARITY WAS IN THE ARRIVAL INTERVALS. BOTH CLINICS REVEALED A RANDOM SYSTEM OF ARRIVALS, THOUGH THE OPERATION OF THE CLINICS IS DISSIMILAR. THIS PHENOMENON APPEARS TO PRODUCE LONGER WAITING TIMES FOR THE PATIENTS; IT IS AN AREA TO WHICH SERIOUS ADMINISTRATIVE CONSIDERATION SHOULD BE GIVEN IN AN EFFORT TO REDUCE THE WAITING TIMES FOR APPOINTED PATIENTS.

CHAPTER IV. INTERPRETATION AND APPLICATION

It must be clearly stated that no attempt was made in this study to assess the inherent values to the patient and the physician of the Air Force Clinic concept. In no way has the author attempted to evaluate either the family physician idea with the advantages of continuity of care or the optimum advantages of clinic organization under the group practice concept of the Air Force Clinic.

The author did not and does not intend to suggest the possibility of changing the Air Force Clinic appointment system concept, for the advantages of organization and the close physician-patient relationship far transcend any to be gained from returning to a completely random system (sick-call system). The only gain might be a slight reduction in patients' total waiting time and this could be accompanied by a reduction in physician service time.

With a growing trend toward group practice clinics in the civilian community, studies of this nature should prove to be helpful in evaluating clinic operation. No direct comparisons should be made unless the population served and the clinic operation are really comparable. The author does believe that appointment systems should periodically be examined in studies of this type so that administrative decisions can be made scientifically rather than intuitively.

CHAPTER V. EVALUATION OF STUDY

This study was conducted in an Air Force medical facility where, if the Hospital Commander is interested in the study, the cooperation of the staff can be somewhat assured. The data was collected primarily by employees of the hospital other than the author. The author tried to be present most of the time in the study clinics to insure that the data would be reliable. Physician service time was recorded in most clinics by the physicians themselves, using either wall mounted clocks or their own watches. The synchronization of watches did not always take place before the clinic started so that some difference in time intervals was observed. The methods used to collect data proved quite successful and the author believes this data is generally reliable. The data cards were official forms of the hospital and as such were respected by the patients who carried them and the employees who filled them out. Reliability of the results is indicated by a 93 per cent return of the data cards. (For detailed breakdown refer to Appendix A-1.)

The primary significance of the results is that they show exactly how the appointment system is operating. This is preferable to the intuitive decision that patients do or do not wait a long time, or that a fifteen minute interval is needed by a specified clinic. Among clinic patients the most common complaint is how long they have to wait from the appointment time to the time

THEY SEE THE PHYSICIAN. THIS STUDY DEALS WITH FACTS--IT GIVES THE AVERAGE NUMBER OF MINUTES A PATIENT HAD TO WAIT FOR ANY OF THE EIGHT CLINICS UNDER OBSERVATION. THE INFORMATION IS OF VALUE, FOR FURTHER STUDIES WILL REVEAL WHETHER ANY ADMINISTRATIVE CHANGES THAT MAY BE MADE INCREASE OR DECREASE THE WAITING AND SERVICE TIMES.

THE OVERALL SIGNIFICANCE OF THE STUDY IS THAT IT PUTS INTO THE HANDS OF THE ADMINISTRATOR SOME RELIABLE DATA FROM WHICH HE CAN EVALUATE HIS CLINIC'S OPERATION AND EITHER CALL FOR FURTHER STUDIES OR MAKE SUCH CHANGES AS HE MAY THINK APPROPRIATE IN STAFFING, SERVICE INTERVALS OR CLINIC HOURS. WE HAVE BEEN WORKING DIAGNOSTICALLY TO FIND OUT EXACTLY WHAT HAPPENS TO PATIENTS IN THE APPOINTMENT SYSTEM. OUR INTENT WAS NOT TO PROVIDE A CURE-ALL OR A SOLUTION TO THESE PROBLEMS, BUT RATHER TO IDENTIFY WHATEVER PROBLEMS HAVE EXISTED.

CHAPTER VI. CONCLUDING STATEMENT

A. Summary of Findings.

This study revealed that in all the clinics studied 62.3 per cent of the patients had firm appointments and 37.7 per cent were in a walk-in status. The Pediatric Clinic had the highest percentage of walk-ins--58 per cent. All the specialty clinics show a high percentage of walk-ins except the Medical, Medical Chest and Urology Clinics.

Appointed patients spent on the average 4.8 minutes at the Pharmacy, 3.7 minutes at the Laboratory, 12.3 minutes waiting for and 11.1 minutes in the X-Ray Service. No patients visited all three ancillary services during a single visit. Only 41.5 per cent of the total number of patients visited one or more of the ancillary services during the study period.

The average Total Waiting Time for appointed patients was 24.3 minutes with a physician service time of 15.3 minutes, whereas for the walk-in patients it was 31.7 minutes and 13.5 minutes respectively. The actual service time agrees closely with the appointment time intervals established in each clinic.

The number of early arrivals for appointments totals 64.3 per cent, whereas only 20.3 per cent of the patients arrived late. The early arrivals experienced an average True Waiting Time of 18.0 minutes, with the Pediatric Clinic showing the highest value of

25.7 MINUTES AND THE UROLOGY CLINIC THE LOWEST VALUE OF 11.7 MINUTES. ALL THREE ORIGINAL HYPOTHESES WERE DISPROVEN BY ANALYZING THE DATA. PATIENTS IN THE SPECIALTY CLINICS EXPERIENCE A SIGNIFICANTLY DIFFERENT TRUE WAITING TIME THAN DO PATIENTS IN THE GENERAL PRACTICE CLINICS; THE AVERAGE TRUE WAITING TIME IS NOT FIFTEEN MINUTES OR LESS FOR EACH CLINIC; AND THERE IS A SIGNIFICANT DIFFERENCE IN PROPORTION OF WALK-INS TO APPOINTED PATIENTS IN THE ADULT AND PEDIATRIC CLINICS AS COMPARED TO THE SPECIALTY CLINICS.

THE ARRIVAL OF PATIENTS TO THE ADULT CLINIC IS COMPLETELY RANDOM AND BEARS NO RESEMBLANCE TO THE APPOINTMENT INTERVAL. THE ARRIVAL INTERVALS GRAPHICALLY DESCRIBE A NEGATIVE EXPONENTIAL DISTRIBUTION, WHICH MEANS A RANDOM INPUT OF PATIENTS TO THE CLINIC. THIS ARRIVAL INTERVAL DATA COULD NOT ADEQUATELY BE DESCRIBED BY A MATHEMATICAL MODEL.

B. <u>CONCLUSIONS</u>.

THE APPOINTMENT SYSTEM IN THE EIGHT CLINICS STUDIED IS NOT OPERATING AS EFFECTIVELY AS IT COULD, PRIMARILY BECAUSE NO CONTROLS ARE PLACED ON THE ARRIVAL OF PATIENTS TO THE CLINICS. MANY EARLY ARRIVALS ARE SEEN BEFORE THEIR APPOINTMENTS, LATE ARRIVALS ARE NOT PENALIZED BUT OFTEN SEEN IN LESS TIME THAN EARLY OR ON-TIME ARRIVALS. WALK-IN PATIENTS ADD TO THIS CONFUSION BY BEING SEEN BETWEEN APPOINTMENTS OR BEFORE APPOINTMENTS, RATHER THAN EXPERIENCING A SIGNIFICANTLY LONGER WAIT THAN DO THE APPOINTMENT PATIENTS.

APPOINTED PATIENTS GENERALLY EXPERIENCE A REASONABLE TRUE WAITING TIME IN ALL CLINICS, FOR IN NO CLINIC DOES THE AVERAGE

EXCEED THIRTY MINUTES. IN NONE OF THE CLINICS DO WALK-IN PATIENTS EXPERIENCE AN UNREASONABLE TOTAL WAITING TIME; IN FACT, THEY SPEND LESS TIME WAITING THAN APPOINTED PATIENTS IN THREE OF THE EIGHT CLINICS STUDIED. THIS EXPERIENCE WILL NOT DISCOURAGE WALK-INS.

GENERALLY THE TOTAL WAITING TIMES FOR ALL PATIENTS ARE MUCH LOWER THAN THOSE EXPERIENCED BY PATIENTS IN THE WORCESTER CITY HOSPITAL STUDY, AND COULD BE FURTHER REDUCED BY EDUCATING THE PATIENT CONCERNING EARLY AND LATE ARRIVAL TIMES.

THE PHYSICIAN SERVICE TIME CLOSELY APPROXIMATES THE APPOINTMENT INTERVALS IN EACH CLINIC; THIS IS ESSENTIAL TO THE SMOOTH OPERATION OF THE APPOINTMENT SYSTEM. THE ONLY CLINICS WHICH EXCEED THE APPOINTMENT INTERVAL ARE PEDIATRICS AND DERMATOLOGY.

THE NUMBER OF WALK-IN PATIENTS PLACES A HEAVY STRAIN ON THE CAPACITY OF THE INDIVIDUAL CLINICS UNLESS OPEN APPOINTMENT INTERVALS ARE SET ASIDE FOR THESE PATIENTS. AT PRESENT, WALK-IN PATIENTS RECEIVE ALMOST THE SAME SERVICE IN BOTH WAITING TIME AND PHYSICIAN SERVICE TIME AS DO APPOINTED PATIENTS. A WALK-IN PATIENT EXPERIENCING THIS SERVICE WOULD DOUBT THE ADVISABILITY OF WAITING TWO DAYS OR MORE FOR AN APPOINTMENT.

THE DATA COLLECTED, ALTHOUGH IT COULD NOT BE DESCRIBED IN A MATHEMATICAL MODEL, MIGHT POSSIBLY BE PROGRAMMED INTO AN ELECTRONIC COMPUTER AND THE CLINIC OPERATION SIMULATED. IF THIS WERE DONE THEN ADMINISTRATIVE DECISIONS CONCERNING STAFFING, CHANGING OF APPOINTMENT INTERVALS AND ELIMINATION OF WALK-IN PATIENTS COULD BE TESTED AND TRIED TO SEE HOW THIS OR THAT STRATEGY AFFECTED

WAITING TIMES OR SERVICE TIMES. THIS WOULD PROVIDE THE ADMINISTRATOR WITH AN INVALUABLE AID TO PROVIDE BETTER CLINIC OPERATION.

C. RECOMMENDATIONS.

DRAWING UP THIS STUDY PROVIDED THE AUTHOR WITH ADDITIONAL INSIGHT INTO APPOINTMENT SYSTEMS. WAITING TIME RESULTS WERE GENERALLY GOOD AND INDICATE THE DESIRE OF HOSPITAL EMPLOYEES TO PROVIDE GOOD SERVICE. THE STUDY COULD HAVE BEEN APPROACHED BY IDENTIFYING EACH PHYSICIAN, SO THAT DIFFERENCES IN SERVICE TIMES BY PHYSICIANS COULD BE POINTED OUT. PHYSICIANS DIFFER IN THEIR MANNER OF PROVIDING SERVICE AND IT WOULD BE HELPFUL TO IDENTIFY THE DIFFERENCES. THE RESULTS MIGHT HAVE SHOWN THAT DIFFERENT APPOINTMENT INTERVALS ARE NEEDED WITHIN EACH CLINIC WITH MORE THAN ONE PHYSICIAN.

EARLY ARRIVALS, ALTHOUGH DESIRABLE, CAN CAUSE A DISTURBANCE IN THE APPOINTMENT SCHEDULE IF THEY ARE SEEN BEFORE THEIR SCHEDULED APPOINTMENTS. THIS, COUPLED WITH THE FACT THAT LATE ARRIVALS ARE SEEN SOON AFTER THEIR ARRIVAL, CAN RESULT IN LONG WAITING TIMES FOR OTHER APPOINTED PATIENTS. A PROGRAM SHOULD BE STARTED TO EDUCATE PATIENTS TO ARRIVE NO MORE THAN 10 MINUTES EARLY, WITH LATE ARRIVALS PENALIZED EITHER BY WAITING FOR A CANCELLATION OR BEING PUT ON THE WALK-IN LIST.

WALK-IN PATIENTS ADD TO THE CONFUSION UNLESS INTERVALS ARE PROVIDED FOR THEM AT THE END OF THE APPOINTMENT SCHEDULES OR OPEN INTERVALS PROVIDED IN THE APPOINTMENT SCHEDULES. ONLY TRUE MEDICAL

EMERGENCIES SHOULD BE SEEN BETWEEN APPOINTMENTS, SO THAT ALL OTHERS WOULD EXPERIENCE A LONGER WAITING TIME THAN THE APPOINTED PATIENTS. THIS WOULD MAKE THE WALK-IN STATUS LESS DESIRABLE THAN IT IS NOW. AN ALTERNATIVE PROVISION FOR WALK-IN PATIENTS WOULD BE TO HAVE A SCREENING CLINIC IN THE EMERGENCY ROOM TO IDENTIFY TRUE MEDICAL EMERGENCIES AND PROVIDE ONE-TIME TREATMENT FOR THEM. OTHER THAN TRUE MEDICAL EMERGENCIES COULD BE REFERRED TO THE CENTRAL APPOINTMENT DESK FOR APPOINTMENT TO THE CLINIC RECOMMENDED BY THE SCREENING PHYSICIAN. THIS PROVISION WOULD REQUIRE PHYSICIAN COVERAGE BUT WOULD ELIMINATE ALL WALK-INS TO THE APPOINTMENT SYSTEM AND PROBABLY LEAVE SOME PHYSICIANS IN THE CLINICS FREE TO FILL THE SCREENING POSITION ON A ROTATING BASIS.

ADDITIONAL STUDIES OF THIS NATURE SHOULD BE MADE PERIODICALLY TO CHECK ON THE EFFECTIVENESS OF THE SYSTEM AND EVALUATE ANY CHANGES THAT MAY HAVE BEEN MADE. THESE STUDIES SHOULD INCLUDE DATA CONCERNING THE ARRIVAL TIMES OF PHYSICIANS TO THE CLINIC, FOR THIS FACTOR ADDS TO WAITING TIMES FOR ALL PATIENTS. DATA WAS NOT COLLECTED FOR THIS STUDY IN SUCH A WAY AS TO ENABLE US TO EVALUATE THIS FACTOR. CLINIC HOURS SHOULD BE SET ASIDE SO THAT INPATIENT DUTIES OF THE PHYSICIANS WILL NOT INTERFERE WITH THEIR ARRIVAL AT THE CLINICS ON TIME. THESE STUDIES SHOULD PROVE A VALUABLE AID TO ADMINISTRATION IN EVALUATING THE APPOINTMENT SYSTEM AND CLINIC OPERATION, AND ALSO PROVIDE A BASIS FOR MANAGEMENT STUDIES OF DEFINITE PROBLEM AREAS.

APPENDIX A

Number of Cards Distributed and Returned by Clinic

Clinic	Distributed	Returned	Percentage of Returns
General Surgery	120	118	90+
Pediatric	373	344	90+
Adult	229	217	90+
Medical	54	47	87+
Medical Chest	55	51	90+
Cardiology	42	41	90+
Urology	68	65	90+
Dermatology	55	48	87+
Totals	996	931	93.4%

Number of Patients (by service) Visiting One or More Ancillary Service

Clinic	Pharm		Lab		X-Ray		Pharm & Lab		Pharm & X-Ray		Lab & X-Ray	
	Appt	W-I	Appt	W-I	Appt	W-I	Appt	W-I	Appt	W-I	Appt	W-I
Gen Surgery	2				3		1				1	
Adult	48	35	8	4	3	4	4	2	1		5	2
Pediatric	49	68	3	7	1	2	11	28		3		
Medical	6	1	5								2	
Med Chest	11		1		2							
Cardiology	4	3		1	1	2			1			
Urology	8		5				2					
Dermatology	10											
Totals	138	107	22	12	10	8	18	30	2	3	8	2

MEAN AND MEDIAN SERVICE TIMES BY PHYSICIANS
AND THE STANDARD DEVIATION OF THE MEANS
BY CLINIC BY CATEGORY OF PATIENTS

	APPT PATIENTS PHYS SVC TIME (MINUTES)			WALK-IN PTS PHYS SVC TIME (MINUTES)		
CLINIC	MEAN	MEDIAN	S.D.	MEAN	MEDIAN	S.D.
GEN SURGERY	9.3	7.8	4.6	8.4	7.2	9.9
ADULT	12.6	14.3	6.5	13.5	12.7	10.1
PEDS	16.3	14.9	11.9	13.5	12.8	10.1
MEDICAL	23.3	20.3	10.9	15.0	14.9	5.0
MED CHEST	22.4	20.6	11.4	12.0	14.9	--*
CARDIOLOGY	28.0	19.7	17.9	19.1	18.8	14.4
UROLOGY	13.5	13.9	6.5	14.0	17.5	8.5
DERMATOLOGY	13.6	9.9	11.8	17.6	17.5	13.3

*S.D. NOT DONE.

Comparison of Mean First and Second Waiting Times and Total Waiting Time by Clinic

Appointed Patients
(minutes)

Clinic	1st Wait Time	2d Wait Time	Total Wait Time
Gen Surgery	14.8	17.7	22.3
Adult	12.7	11.8	18.6
Peds	9.5	25.7	30.3
Medical	13.1	19.3	27.4
Med Chest	13.7	25.1	35.2
Cardiology	12.5	13.6	20.9
Urology	19.2	11.7	18.5
Dermatology	8.3	20.7	24.5

*Averages of columns 1 and 2 do not add up to give totals in column 3 because of different numbers of patients in each column. Averages are based on the number of patients who actually experienced waits in the three categories.

CHI-SQUARE TESTS FOR SIGNIFICANCE
TRUE WAITING TIMES FOR APPOINTED PATIENTS
COMBINED MEDIAN VALUES P = .05

ADULT CLINIC VS MEDICAL AND SURGICAL SPECIALTIES

PEDIATRIC CLINIC VS MEDICAL AND SURGICAL SPECIALTIES

	ADULT GEN SURG			ADULT MEDICAL			ADULT MED CHEST		
BELOW MED	71	42	113	72	13	85	74	16	90
ABOVE MED	63	49	112	62	23	85	60	29	89
TOTALS	134	91	225	134	36	170	134	45	179
	$X^2 = 1.01$			$X^2 = 3.52$			$X^2 = 5.21$		

	ADULT CARDIOL			ADULT DERM		
BELOW MED	66	13	79	73	7	80
ABOVE MED	68	11	78	61	18	79
TOTALS	134	24	158	134	25	159
	$X^2 = 0.71$			$X^2 = 5.90$		

	PEDS GEN SURG			PEDS MEDICAL			PEDS MED CHEST		
BELOW MED	58	54	112	62	22	84	67	22	89
ABOVE MED	74	37	111	70	14	84	65	23	88
TOTALS	132	91	223	132	36	168	132	45	177
	$X^2 = 5.11$			$X^2 = 2.26$			$X^2 = 0.46$		

	PEDS CARDIOL			PEDS UROLOGY			PEDS DERM		
BELOW MED	60	18	78	55	37	92	67	12	79
ABOVE MED	72	6	78	77	16	93	65	13	78
TOTALS	132	24	156	132	53	185	132	25	157
	$X^2 = 7.09$			$X^2 = 7.70$			$X^2 = 0.20$		

Chi-Square Tests for Significance
Proportion of Walk-Ins to Appointed

Adult Clinic vs Med and Surg Specialties

	Adult	Gen Surg	Totals	Adult	Medical	Totals
Appts	134	91	225	134	36	170
W-I	69	29	98	69	3	72
Totals	203	120	323	203	39	242
		$X^2 = 3.4$			$X^2 = 10.8$	

	Adult	Med Chest	Totals	Adult	Cardiol	Totals
Appts	134	45	179	134	24	158
W-I	69	1	70	69	14	83
Totals	203	46	249	203	38	241
		$X^2 = 18.7$			$X^2 = 0.1$	

	Adult	Urology	Totals	Adult	Derma	Totals
Appts	134	53	187	134	25	159
W-I	69	4	73	69	22	91
Totals	203	57	260	203	47	250
		$X2 = 16.0$			$X^2 = 2.7$	

Chi-Square Tests for Significance
Proportion of Walk-Ins to Appointed

Pediatric Clinic vs Med and Surg Specialties

	Peds	Gen Surg	Totals	Peds	Med	Totals	Peds	Med Chest	Totals
Appts	132	91	223	132	36	168	132	45	177
W-I	185	29	214	185	3	188	185	1	186
Totals	317	120	437	317	39	356	317	46	363
		$X^2 = 40.7$			$X^2 = 35.7$			$X^2 = 50.7$	

	Peds	Cardio	Totals	Peds	Urol	Totals	Peds	Derma	Totals
Appts	132	24	156	132	53	185	132	25	157
W-I	185	14	199	185	4	189	185	22	207
Totals	317	38	355	317	57	374	317	47	364
		$X^2 = 18.7$			$X^2 = 50.9$			$X^2 = 10.1$	

CHI-SQUARE TESTS FOR SIGNIFICANCE
COMPARISON OF TOTAL WAIT TIME OF
APPTS VS WALK-INS IN EACH CLINIC
(COMBINED MEDIAN VALUES)

GEN SURG CLINIC

	APPT	WI	TOTALS
BELOW MED	46	14	60
ABOVE MED	45	15	60
TOTALS	91	29	120

$X^2 = 0.1$

ADULT CLINIC

	APPT	WI	TOTALS
BELOW MED	79	23	102
ABOVE MED	55	46	101
TOTALS	134	69	203

$X^2 = 15.7$

PEDIATRIC CLINIC

	APPT	WI	TOTALS
BELOW MED	85	74	159
ABOVE MED	47	111	158
TOTALS	132	185	317

$X^2 = 17.8$

MEDICAL CLINIC

	APPT	WI	TOTALS
BELOW MED	17	3	20
ABOVE MED	19	0	19
TOTALS	36	3	39

$X^2 = 3.2$

CARDIOLOGY

	APPT	WI	TOTALS
BELOW MED	9	10	19
ABOVE MED	15	4	19
TOTALS	24	14	38

$X^2 = 4.1$

UROLOGY CLINIC

	APPT	WI	TOTALS
BELOW MED	29	0	29
ABOVE MED	24	4	28
TOTALS	53	4	57

$X^2 = 4.5$

DERMATOLOGY CLINIC

	APPT	WI	TOTALS
BELOW MED	11	13	24
ABOVE MED	14	9	23
TOTALS	25	22	47

$X^2 = 1.1$

Chi-Square Tests for Significance
Total Wait Time of Early Arrivals vs Late Arrivals
(combined medians)

	Late Arrivals	Early Arrivals	Totals
Below median	72	198	270
Above median	38	232	270
Totals	110	430	540

$X^2 = 13.26$

Chi-Square Tests for Significance
True Waiting Time of Early Arrivals vs
Total Wait Time of Late Arrivals
(combined medians)

	Late Arrivals	Early Arrivals	Totals
Below median	45	225	270
Above median	65	205	270
Totals	110	430	540

$X^2 = 4.56$

APPENDIX B

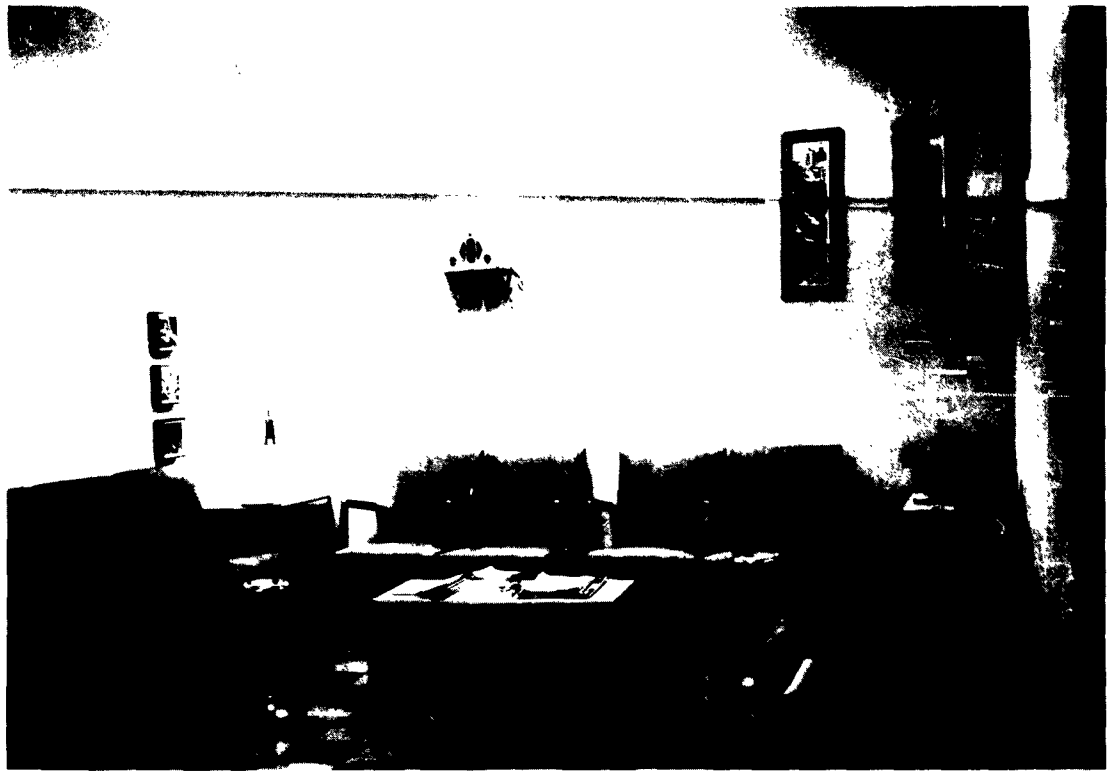
LIST OF PICTURES

PICTURE 1

PICTURE 2

PICTURE 3

PICTURE 4

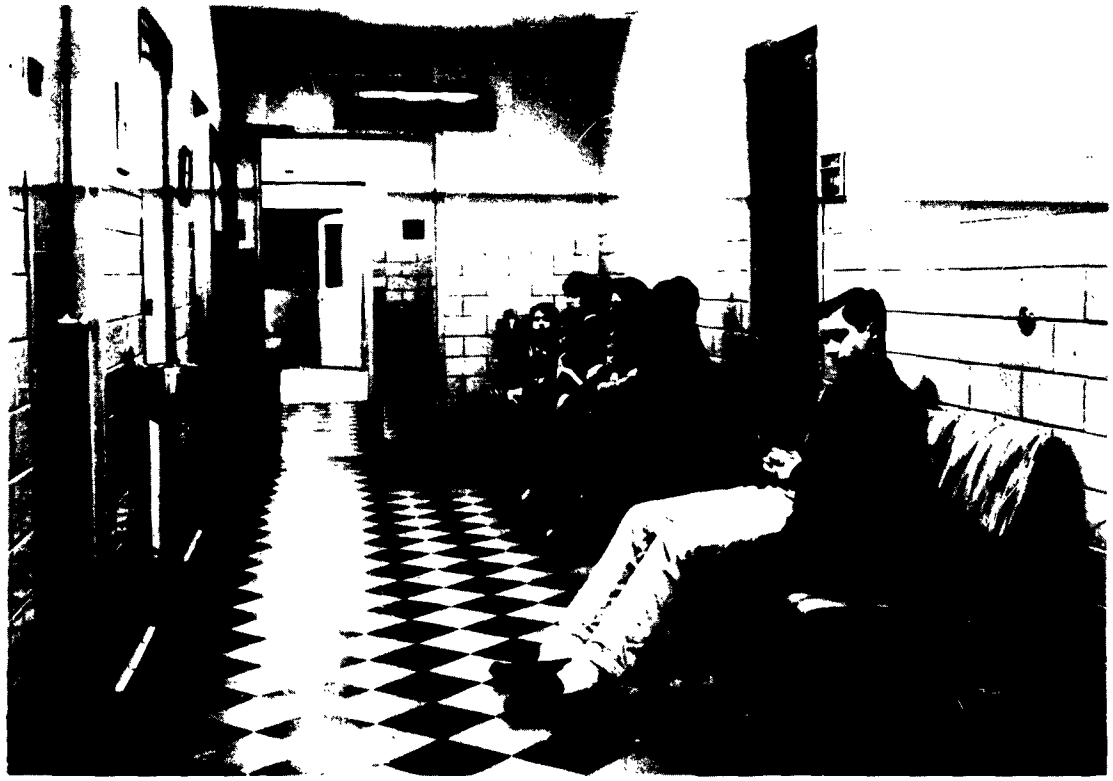


PICTURE 5

PICTURE 6

PICTURE 7

PICTURE 8



PICTURE 9

PICTURE 10

APPENDIX C

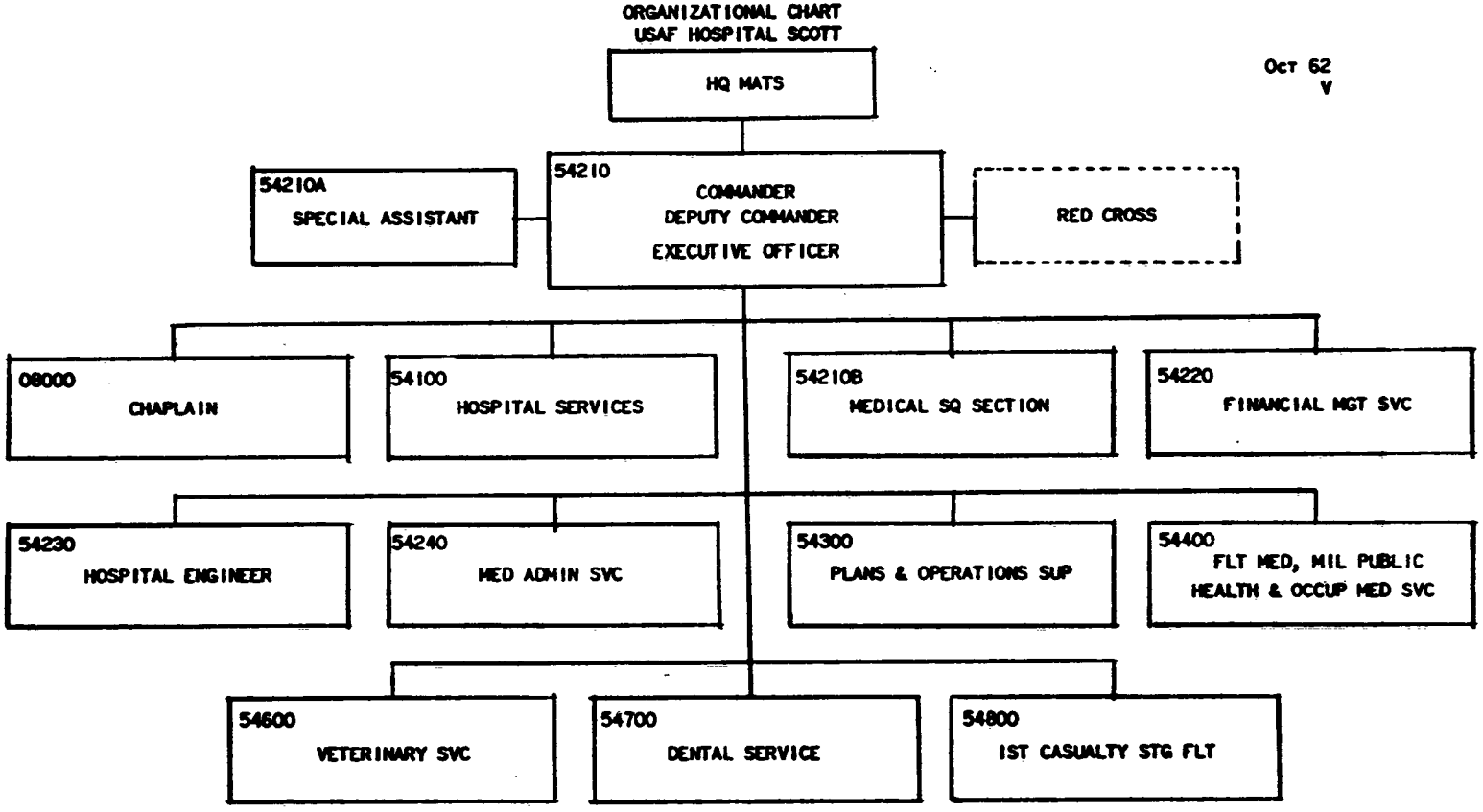

ORGANIZATIONAL CHART
USAF HOSPITAL SCOTT
Oct 62
V
HQ MATS
54210A
SPECIAL ASSISTANT
54210
COMMANDER
DEPUTY COMMANDER
EXECUTIVE OFFICER
RED CROSS
08000
CHAPLAIN
54100
HOSPITAL SERVICES
54210B
MEDICAL SQ SECTION
54220
FINANCIAL MGT SVC
54230
HOSPITAL ENGINEER
54240
MED ADMIN SVC
54300
PLANS & OPERATIONS SUP
54400
FLT MED, MIL PUBLIC
HEALTH & OCCUP MED SVC
54600
VETERINARY SVC
54700
DENTAL SERVICE
54800
1ST CASUALTY STG FLT

FIGURE 1

ORGANIZATIONAL/FUNCTIONAL CHART
USAF HOSPITAL SCOTT

21
JAN 63

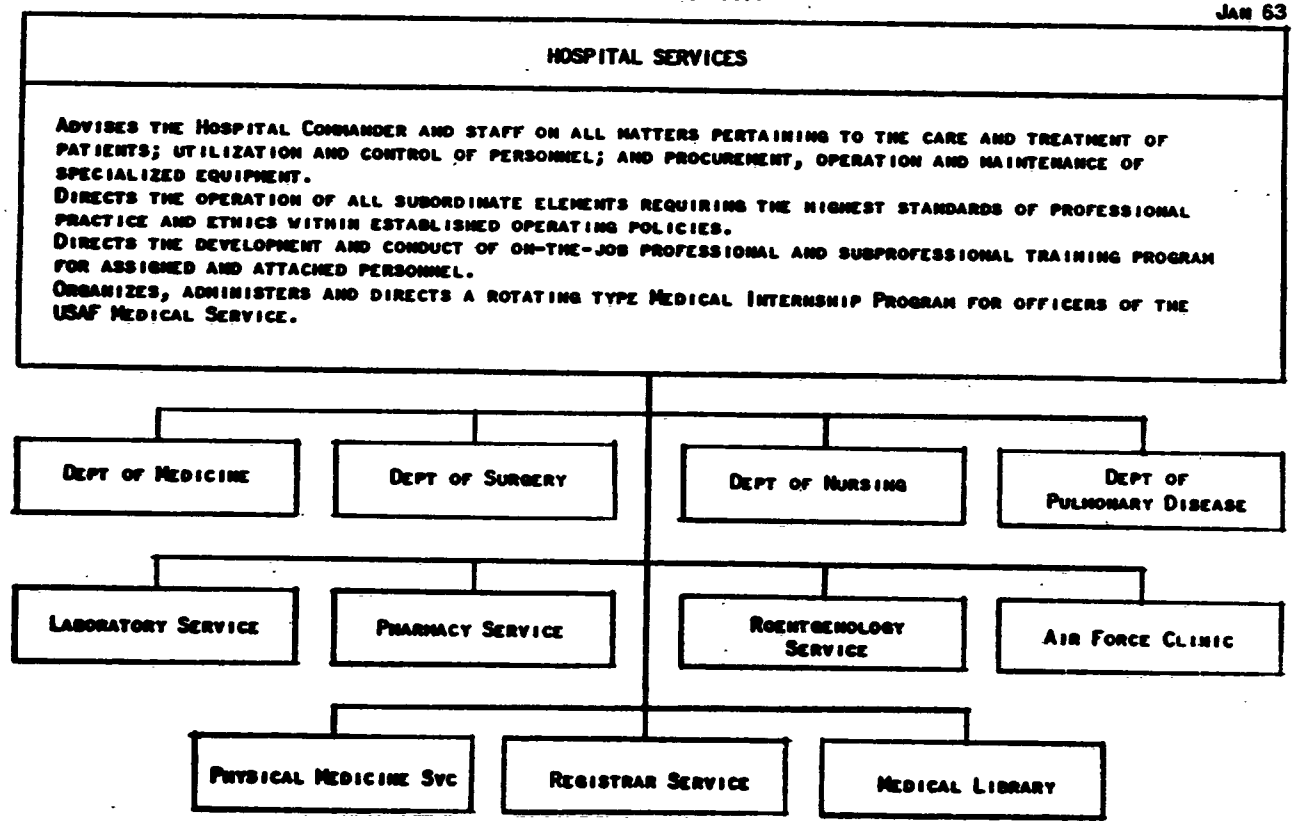


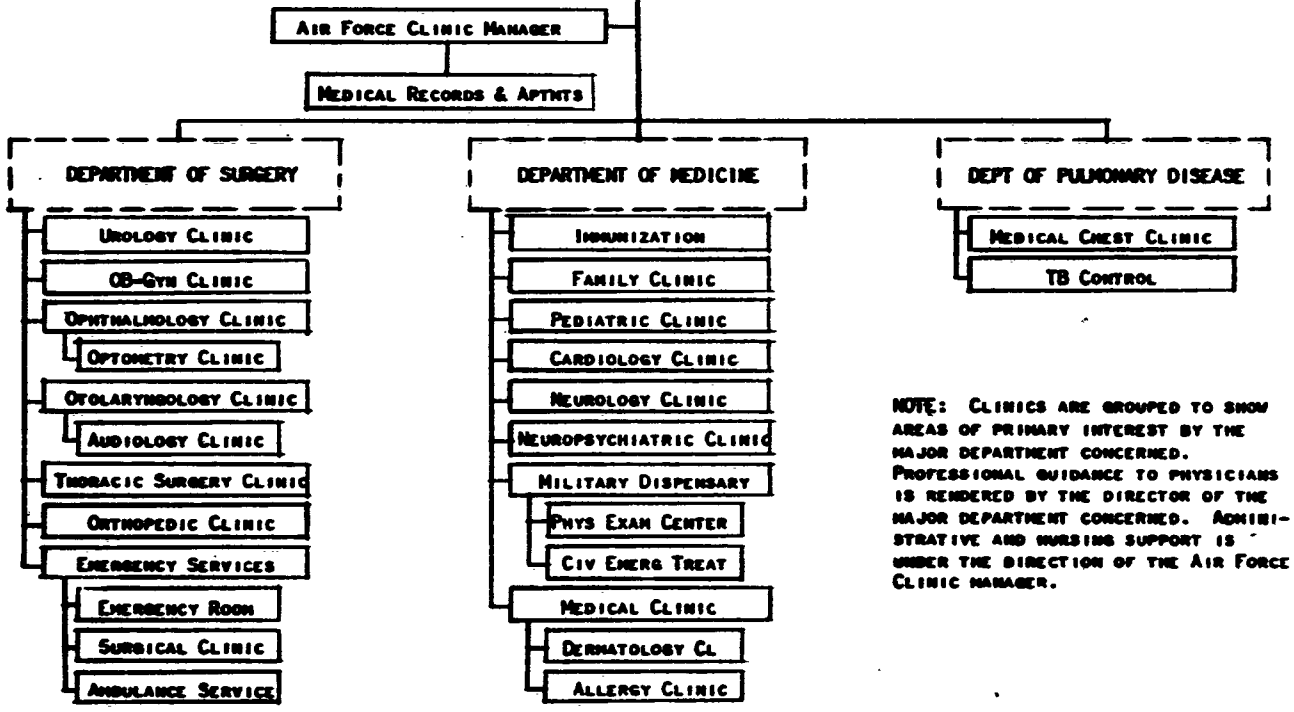
FIGURE 2

ORGANIZATIONAL/FUNCTIONAL CHART
USAF HOSPITAL SCOTT

26
JAN 63

AIR FORCE CLINIC

THE DIRECTOR OF HOSPITAL SERVICES, IN HIS CAPACITY AS CHIEF OF THE AIR FORCE CLINIC, IS RESPONSIBLE FOR WELDING THE PROFESSIONAL, SUB-PROFESSIONAL AND ADMINISTRATIVE STAFF INTO ONE INTEGRAL GROUP WITH A COMMON ENDEAVOR. SPECIFICALLY, THE AIR FORCE CLINIC WILL SUPPORT PHYSICIANS IN THE FOLLOWING ACTIVITIES: EXAMINATION, CARE AND TREATMENT OF ALL AMBULATORY PATIENTS INCLUDING SCREENING OF PATIENTS FOR HOSPITAL ADMISSION; ROUTINE AND RECURRING NON-FLYING PHYSICAL EXAMINATIONS, AND PREPLACEMENT AND OTHER PHYSICAL EXAMINATIONS FOR CIVILIAN EMPLOYEES; AND IMMUNIZATION SERVICE.



NOTE: CLINICS ARE GROUPED TO SHOW AREAS OF PRIMARY INTEREST BY THE MAJOR DEPARTMENT CONCERNED. PROFESSIONAL GUIDANCE TO PHYSICIANS IS RENDERED BY THE DIRECTOR OF THE MAJOR DEPARTMENT CONCERNED. ADMINISTRATIVE AND NURSING SUPPORT IS UNDER THE DIRECTION OF THE AIR FORCE CLINIC MANAGER.

C-3

FIGURE 3

BIBLIOGRAPHY

Administration of Medical Treatment Activities, Air Force Manual 160-20, Washington: Department of the Air Force, 12 Jun 61.

Betts, B. H., "Waiting in Outpatient Departments," Hospital and Health Management, Vol 20 (September 1957), pp 322-324.

Carstairs, L. W., "Outpatient Waiting Time," The Hospital, Vol 56 (May 1959), pp 359-360.

Collins, Glenn J., "Hospital Outpatient Service and Sound Planning," U. S. Armed Forces Medical Journal, Vol 11, No 5 (May 1960), pp 516-524.

Dale, A. C., "An Appointment System," The Hospital, Vol 47, No 8 (August 1951), pp 569-572.

Fischer, M. M., "Outpatient Departments Have a Long Way To Go," American Journal of Nursing, Vol 61, No 8 (August 1961), pp 56-59.

Geppert, Leo J., Lt Col, USA, "Evolution of Pediatric Service in the U. S. Army," Armed Forces Medical Journal, Vol 11, No 4 (April 1960), pp 373-380.

Hardie, M. C., "Waiting by Outpatients," The Hospital, Vol 50 (November 1954), pp 681-686.

Hardie, M. C., "Waiting by Outpatients--A Further Study of 50 Clinics," Hospitals, Vol 51, No 11 (November 1955), pp 763-765.

Howell, J. T., and Buerki, R. C., "Adapting the Outpatient Department to Modern Medical Needs," Hospitals, Vol 32 (March 1, 1958), pp 33-35.

Letourneau, Charles U., "A Time-Study for Better Care in the Outpatient Clinic," Hospitals, Vol 25, No 10 (October 1951), pp 109-112.

Millnard, R. C., "How Long Do Outpatients Wait?" The Hospital, Vol 50 (October 1954), pp 612-617.

Niess, O. K., Major General, USAF, "Medicine in the Aerospace Age," U. S. Armed Forces Medical Journal, Vol 11, No 1 (January 1960), pp 34-35.

SLOAN, R. P., THIS HOSPITAL BUSINESS OF OURS, PP 200-201.

SMITH, JAMES, "TIME AND MOTION STUDY IN OUTPATIENTS' DEPARTMENT," HOSPITAL AND SOCIAL SERVICE JOURNAL, VOL 64 (AUGUST 13, 1954), PP 311-312.

SOLON, JERRY A., SHEPS, CECIL G., AND LEE, SIDNEY S., "PATTERNS OF MEDICAL CARE: A HOSPITAL'S OUTPATIENTS," AMERICAN JOURNAL OF PUBLIC HEALTH, VOL 50, NO 12 (DECEMBER 1960), PP 1905-1913.

THOMAS, EDWARD J., "THIS APPOINTMENT SYSTEM IS WORTH THE EFFORT," THE MODERN HOSPITAL, VOL 74 (FEB 1950), PP 74-76.

"WAITING FOR DOCTOR," BRITISH MEDICAL JOURNAL, (OCTOBER 11, 1958), P 901.

WELCH, J. D., AND BAILEY, NORMAN T. J., "APPOINTMENT SYSTEMS IN HOSPITAL OUTPATIENT DEPARTMENTS," LANCET, VOL I (MAY 31, 1952), PP 1105-1108.

WORKING PARTY OF THE HOSPITAL DISCUSSION GROUP, "WAITING TIME IN OUTPATIENT DEPARTMENTS," THE HOSPITAL, VOL 52, NO 9 (SEPTEMBER 1956), PP 575-582.

WORLEY, JOHN D., JR., "CLINICS CAN KEEP OUTPATIENTS FROM BECOMING IN-PATIENTS," THE MODERN HOSPITAL, VOL 93, NO 5 (NOVEMBER 1959), PP 90-93.

YVONNE, SISTER MARY, "O.P.D. APPOINTMENT SYSTEM," HOSPITAL PROGRESS, VOL 34 (APRIL 1953), PP 61-62.

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